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CONTENTS

ILLUSTRATIONS:	PAGE.		PAGE.
Microscopic and Other Tests of Phosphor Bronze Bearing Metals.....	212	New Publications.....	219
Steamboats for the Yukon.....	213	Trade Catalogues.....	220
Design for a Cast Steel Locomotive Frame.....	214	GENERAL NEWS:	
Electric Circuits for Automatic Block Signals.....	214	Locomotive Building.....	222
A Small Coal Station on the Northern Pacific.....	215	Car Building.....	222
The Lamb Woven Wire Fence.....	216	Bridge Building.....	223
The Haley Bumping Post.....	216	Meetings and Announcements.....	223
A New Car Wheel Boring Mill.....	216	Personal.....	223
Car Lighting From the Axle.....	216	Elections and Appointments.....	224
A Schenectady Ten Wheel Locomotive—Boston & Maine.....	217	Railroad Construction.....	224
		Electric Railroad Construction.....	225
		General Railroad News.....	225
		Electric Railroad News.....	226
		Traffic.....	226
CONTRIBUTIONS:		MISCELLANEOUS:	
Some Effects of Small Differences of Piston Area.....	211	Technical.....	221
		The Scrap Heap.....	221
EDITORIALS:		California Railroads.....	211
Some of the Troubles with Height of Drawbars.....	218	The February Snow Storm in Massachusetts.....	211
Where our Breadstuffs are Grown.....	218	Alabama Railroad Commissioners Report.....	213
February Accidents.....	218	Minnesota Railroad Commissioners Report.....	214
Annual Reports—Texas & Pacific.....	219	Rapid Transit in New York.....	214
The Systematic Time Table of the Old Colony.....	219	Train Accidents in the United States in February.....	217
EDITORIAL NOTES.....	218	Reduction of Passenger Fares in North Carolina.....	220

Contributions.

Some Effects of Small Differences of Piston Area.

To the Editor of the Railroad Gazette:

There appeared in your paper recently the plan of a new locomotive, and as shown there was about 2 per cent. more effective piston area when moving toward the drivers than when moving from them. Will some one kindly tell what effect this will have on the riding of the engine, and upon the repair account of the engine?

X.

[The point raised is of small importance because other factors enter to make the variation of the work done in either end of the cylinder greater than two per cent. For instance, to have the same total effective pressure on each side of the piston it would be necessary to so set the valves that the mean effective pressure per square inch on the crank end would be slightly greater than the mean effective pressure on the head end. This difference in the valve setting would be so slight that such a refinement could not be attained in practice, and, with the ordinary valve gear, if the exact proportions should be obtained for a certain condition of speed, cut-off and steam pressure, any variation from this particular set of conditions might easily result in variations in the mean effective pressure per square inch, amounting to more than a difference of two per cent. in the total effective pressures. The mean effective pressure enters as a factor in computing the horsepower, and it is of as much importance as the piston area, but these small variations do not seem to have any appreciable effect on the riding of the engine and cannot be measured by the cost of repairs. It is only by careful work with the steam indicator that the difference can be determined with any degree of accuracy.]

How much variation has been found to exist between the total effective pressures on the opposite sides of the pistons of a locomotive, the valves of which were set with unusual care, is shown by the following figures from representative indicator cards taken from the Purdue locomotive, "Schenectady No. 1." This engine has the following dimensions:

Cylinders.....	17 in. x 24 in.
Piston rod, diameter.....	3 in.
Driving wheels, diameter.....	63 in.
Richardson balanced valves.....	
Outside lap.....	3/4 in.
Inside.....	1/4 in.
Length steam ports.....	16 in.
Width.....	1 1/4 in.
exhaust ".....	2 1/4 in.

The following table shows the variation in the mean effective pressures of the head and crank ends of the cylinders under different conditions of working, together with the ratios of the mean effective pressures for the two ends:

Speed, miles per hour.	Boiler pressure, lbs. per sq. in.	Cut off.		Mean effective pressure, (lbs. per sq. in.)		Ratio of M. E. P. = $\frac{n}{m}$
		Notch off center.	Inches of stroke.	Head end (m)	Crank end (n)	
Right cylinder :						
35	130	1st	6	25.8	28.3	1.097
35	130	2d	6	39.2	42.7	1.089
35	130	3d	10	47.7	48.3	1.013
35	98	2d	8	27.4	29.5	1.077
35	123	2d	8	39.2	42.7	1.089
35	143	2d	8	48.2	50.7	1.052
Left cylinder :						
15	130	1st	6	45.1	44.5	0.987
25	130	1st	6	33.9	32.8	0.968
35	130	1st	6	30.5	30.9	1.013
45	130	1st	6	22.6	24.5	1.084
55	130	1st	6	18.5	18.8	1.016

For the locomotive in question to obtain equal total effective pressures on either side of the pistons the ratio of the mean effective pressures would need be $\frac{n}{m} = \frac{17^2}{17^2 - 3^2} = 1.032$, where m is the mean effective

pressure per square inch of the head and n that of the crank end of the cylinder. In other words if the mean effective pressure per square inch on the front of the piston be taken as 1, that the total effective pressures for both sides may be the same, the mean effective pressure on the back will be represented by 1.032. Ratios given in the table greater than 1.032 therefore indicate an excess of total effective pressure on the crank side, and likewise ratios less than 1.032 indicate that the total pressure on the front of the piston is the greater.

It is apparent that not only do these ratios vary with changes in cutoff, boiler pressure and speed, but a considerable difference is shown between the performance of the right and left cylinders. Thus for the given conditions the ratios for the right cylinder vary from 1.013 to 1.097, showing in one case 1.8 per cent. greater total effective pressure for the head end and in the other 6.3 per cent. greater effective pressure for the crank end. For the left cylinder the extremes are 6.2 per cent. greater effective pressure on the head end in one case, and in the other 5.0 per cent. greater effective pressure on the crank end. It is evident that with the same valve setting the ratio of the work done in the two ends of a locomotive cylinder is a variable depending upon the working conditions, and that it would be useless to attempt any adjustment which would allow for the area of the piston rod, even if such an adjustment could be easily made.

Large numbers of stationary engines, such as the Westinghouse, are in service with trunk pistons where steam is used on one side of the piston only. Such an arrangement can be cited as the extreme case of the point raised by this correspondent, and the easy running of this type of engine and the small repairs required, disposes of the further questions presented.—Editor Railroad Gazette.]

California Railroads.

California is considered by some to be our distant colony. In olden times she would have been a kingdom by herself—if not several. The transcontinental railroads have alone kept her star on our flag, and those of us who know, feel great pride that she is a member of that sisterhood, often, but somewhat wrongly described as "the land of the free and the home of the brave." California railroads have not a few peculiar conditions to contend with—mountains, deserts, streams flowing two ways and high prices of supplies.

The great railroad of the State is, of course, the Southern Pacific of Kentucky, which, like all large animals, has many moods—sometimes gentle, sometimes roaring with anger, and sometimes just growling with nothing to be afraid of.

This monster lies over the State like an "octopus," and is frequently so called. The observer finds much in its anatomy to commend. Particularly I may mention its method of construction on the deserts. The track in such places is laid as near the natural grade as possible so that in event of washouts and waterspouts the grade will form little or no obstruction to the water, the theory being that in this way the track proper will remain practically uninjured, and that it can be quickly relaid. The deserts have generally a gravelly soil, making good ballast.

The surfacing of track on the Southern Pacific is not in accord with modern practice, for, instead of a wide bank and ballast to or beyond the ends of the ties, it is their practice to cover the ties some three inches in the middle and to slope away to the bottom corner of the tie. The result is, as one might expect, a centre-bound and rocking track where all the natural conditions favor the best track. My own observation is that the track is not as smooth as it was some few years ago. Except in clay soil I can see no use of any ballast on the tie between the rails.

Firing is most intelligently done. Such a thing as an engine belching forth black smoke is unknown. The firing itself is properly done, and in addition a baffle door is used that is simple and effective. Near Los Angeles a good part of the engines burn oil, and all of the engines of the other companies—the Southern California (Atchison System) and the Terminal do. No fuel approaches oil where it can be cheaply obtained. It is so easy to regulate the fire, there is no smoke and no danger of fires to adjoining property—a very important consideration in a dry country.

It is a fact that the mountain torrents often flow two ways—that is, they are continually cutting one bank as they flow down the broad talus from the canyons. There are instances where an original bridge of, say, one hundred feet of low trestle is now one thousand, the stream constantly hugging one bank. The older portion can be, and sometimes is, taken out or filled.

The Southern Pacific power and equipment is kept in high condition and clean in appearance. I notice recently that they are indicating the size and class of the engine by small letters under the cab window.

The Pullman equipment on the line is partially owned by the Southern Pacific, as evidenced by the numbering—the small letters S. P. over the door; last, but not least, by not being very cleanly kept within. There are few vestibules, even on the Pullmans. The Pullman trucks are the old pattern, with small iron wheel and no outside bearings. This on a centre-bound track makes the car ride very roughly.

The Sunset Limited on the S. P. and the California Limited on the Santa Fe are the best of trains. The dining service on the latter, which is run by Harvey, far excels any dining car service in the East. The cooks are French, and so is the steward. The cars run through from Kansas City to Los Angeles, three days and two nights.

The Santa Fe is experimenting with "axle light" electricity. If proper attention is given by the trainmen to shifting batteries every four hours it is very satisfactory, and it has the advantage of absence of heat. During the day the dynamo should charge alternately one battery then the other, and this shifting is as yet overlooked by the trainmen.

It is announced that the "Valley Road," so-called, will be completed to Bakersfield by March. Contracts are being let for its construction from Stockton to Port Richmond, opposite San Francisco, but it will require at least eighteen months to complete this section, as there is on it a tunnel exceeding a mile in length. There will then be a competing line south 300 miles to the upper end of the great San Joaquin Valley. It is only some fifty miles from Bakersfield south to Mojave, the western terminus of the Santa Fe Pacific, née Atlantic & Pacific, and about one hundred additional to Los Angeles. The completion of a line to Mojave (within this distance is a mountain range, however, by no means impenetrable) will give a competing line across the continent and to the bay of San Francisco independent of the S. P. At present the traffic relations between the Santa Fe system and the Southern Pacific are extremely close. "In time of peace prepare for war," and that is what one of them is doing.

At present the number of cars of citrus fruits sent east exceeds that of any other product, but it is not improbable that in a few years beet sugar shipments will outnumber the fruit shipments. It should be more profitable to the railroads, inasmuch as it will not require the special refrigerator equipment.

G. B. L.

Los Angeles, March 1.

The February Snow Storm in Massachusetts.

BY GEORGE W. BLODGETT.

The great snow storm of Jan. 31 brought into prominence many lessons which there has not been so good an opportunity to learn for 30 years.

The railroads centering in Boston, and extending along the shore within a few miles of the coast, suffered heavily, and will be a long time in recovering.

The destruction of property was very great and the deterioration and damage to much that was not actually destroyed would amount to an astonishing sum could it be computed. The inconvenience and loss resulting from delay and interruption of service were serious, as was the injury to the health of employees who were exposed to the weather for several days and nights before normal traffic was resumed. Trains were stalled for many hours and many were abandoned until the next day or the day after. Passenger brakemen, not properly clothed for such an experience, were in some cases out flagging for the whole night; others were on duty for a day and a night of continuous work. The storm was the most terrific ever known to those who have seen the longest service. Fortunately the night was tolerably warm; had it been as cold as our winter storms frequently are there must have been much loss of life. As it is, the fatalities seem all to have been at sea. Some collisions of trains took place, but they were not very serious, although there were many narrow escapes. In one case the negligence of an operator caused a confusion of orders, which resulted in a head collision between a milk train and a snow plow. The engine of the milk train ran up the slope of the plow and over it, finally coming to rest on the top of the locomotive which was pushing the plow. Neither the plow nor the engine was derailed nor so seriously injured but that, by the help of another engine, the train was run upon a siding, where its unnatural rider could be dismounted.

One of the most significant lessons of the storm relates to the construction and maintenance of block signal and telegraph wires. In the experience of several of the roads at Boston the most serious interruption of traffic came from poles and wires falling on the tracks or over them so as to endanger trains. In one case known to the writer there would have been absolutely no interruption of traffic after the storm ceased had not poles and wires fallen. In one case the trackmen and others flatly refused to touch

the fallen wires, because they were known to have been crossed with wires carrying heavy currents, which it was feared might be dangerous to life. The line from which the high tension currents came carried a large number of electric light wires and had fallen down on the Western Union Telegraph wires, which in their turn fell on the railroad signal and telephone wires with disastrous results. Instruments were burned out for several miles along the road, and one of the stations was set on fire a mile from the place of the accident before these wires were cut away.

On the Boston & Albany practically all the damage was within ten miles of Boston; beyond that point nearly everything was in good order, but near the city the destruction was complete. The body of snow was large and it was very moist, so that it adhered to whatever it touched, and the poles and wires gave way under the load and went down by the hundred. Many of the wires were coated with ice to a size of two inches or more for long distances, while much larger diameters were occasionally found. Even this size, for a line of thirty wires on poles 125 ft. apart would load each wire with a load of about 170 lbs., and each pole with an additional weight of nearly three tons. It is no wonder that some pole, weaker than the other, gave way under these circumstances; and as soon as the wires were broken by the fall of one pole an enormous unbalanced force was left acting on the others, and pole after pole fell, until some place was reached where the wires were slack enough to relieve the strain.

Not all the poles that fell were old or weak. Some lines that went down in hopeless ruin were of copper on yellow pine poles a foot square, and seemingly as well constructed as a pole line can be, but these fared but little better than some of the cheaper lines. The poles were not intended to carry this great addition to the weight of the wires.

Before the storm had ceased the whole available force of men (reinforced by a large number of Italians) was put to work clearing the snow from platforms, switches and yards, and the store tracks where passenger cars are kept. The delay in getting out these cars caused much inconvenience. In some cases the stations were full of passengers who could not be sent promptly home, for the reason that no cars could be got to send them in. Large numbers of people who usually go by the street railroads were forced to use the steam cars, as the electric roads had ceased running altogether, and the steam roads deserve credit for taking care of the crowds as well as they did.

The work of clearing away the debris was carried on with great energy. Poles and wires lying across the tracks in inextricable confusion were removed in the easiest way possible, sometimes by dragging them off, sometimes by cutting into short lengths and rolling into the ditch, and sometimes, when not broken up, by putting them again upright and fastening them with guys. There were many poles not actually on the ground, which yet leaned so far over the tracks as to endanger trains. These in most cases could be pulled back into place.

On the Old Colony the iron posts of the automatic signals were sometimes broken off short by the force of the wind, and the instruments ruined or badly damaged. Block signals were necessarily abandoned, as all the circuits were in hopeless confusion; and as there were no telegraph wires working special flagmen were stationed. These held trains for a short time, and then allowed them to enter the block under a cautionary signal, if following any train within ten minutes. These were withdrawn as fast as sections of the block signals were again in operation. The delay was aggravated by the fact that some of the instruments were found to have been stolen. Indeed, the storm, while furnishing work to all who wanted it, also brought a harvest to thieves and others who live by their wits, and their bankers who deal in junk.

On the Boston & Albany, as all the line was in good order except near Boston, train dispatching was done in the usual manner from a station ten miles out, orders being carried over the intervening space by trains instead of by wire. This had to be done for several days. The block signals were brought into service as rapidly as possible, taking those first that could be restored with the least labor, while those needing extensive repairs were left till the last. Temporary work was done in many cases where there were no poles, the wires being run on the fences, trees or on the ground—any way to get circuits complete; the lines being afterward gone over again and the work put in permanent shape.

One of the most obvious of the lessons from these costly experiences is the importance of constructing telegraph and signal lines better than has been hitherto done. The best of all remedies would be to put the wires underground. The expense of rebuilding them, as has now been necessary, would go far toward laying a cable in a box at one side or in the middle of the roadbed, just above or below the surface, where it could not be affected by storms and would be easily accessible for repairs. Where, for financial reasons, this cannot be done at

once, the lines should be put on strong poles, much nearer the ground than has been the common practice; also in the opinion of the writer, larger wires should be used, and poles should be set nearer together. Were the latter suggestions adopted, while there might still be occasionally small derangements, there would not be again such wholesale destruction as has now taken place.

Although no such storm has occurred for many years, and is unlikely to happen again soon, there is no security that it may not come to-morrow. In any year it may be necessary to make heavy repairs to poles which, with cables, either underground or in a box above ground, would be unnecessary. It is the writer's opinion that the interest on the cost of such construction added to the yearly expense of maintenance, would not be so large a sum as is annually paid for repairs of aerial lines, added to a fair proportion of the expense of such rebuilding as has been done this year.

There is another point from which the subject should be viewed. The entire obliteration of several miles of block signals on a railroad is a most serious danger, no matter how many men are put on to fill the gap. They do not and cannot take the place of the signals and they do not diminish the chance of accident. The fact that it is an emergency, and not their regular work, renders them less reliable and efficient than they are at their usual occupations and far less so than men specially trained for that particular work would be.

The writer therefore thinks that a wisely conservative policy would be to place in a cable or underground every year such a portion of the railroad wires as circumstances will permit, until all are thus disposed of. He believes money might be saved by so doing, and he is certain that the freedom from interruption would be most gratifying to the operating department.

Microscopic and Other Tests of Phosphor Bronze Bearing Metal.

I discussed the question of oxide in bearing metals in the Railroad Gazette, March 4, the effect of the same, its appearance and detection by the use of the microscope. I furthermore spoke of the

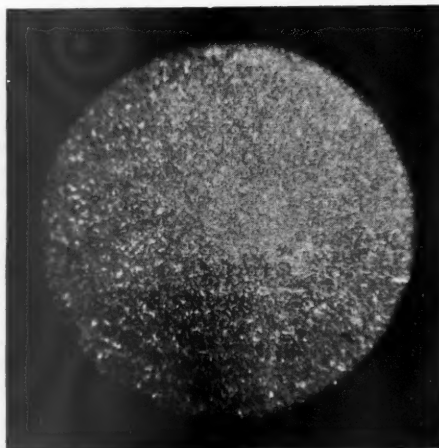


Fig. 1.—A Bearing Bronze Without Phosphorus.

reduction of this oxide by the well-known methods now in use, the most important and effective means of eliminating all oxide from an alloy, such as is used for bearing purposes, being by the use of phosphorus. Phosphorus not only reduces all oxide in an alloy, but also imparts to it, when it is used in excess, certain properties such as greater fluidity, soundness and hardness, all of which are very desirable features which make it an exceedingly valuable alloy for various purposes. But while an alloy to be used for bearing purposes may have these desirable properties, by the addition of phosphorus they are had at the sacrifice of a more important property, viz., the anti-frictional property.

I am speaking now particularly of remelted scrap phosphor bronze. The newly made alloy, if properly manipulated, is quite satisfactory in every respect and gives excellent results.

In order to discover why the remelted phosphor bronze should be so inferior to the newly made material, I determined to make some experiments in a practical way. The fact that phosphor-bronze scrap is far inferior to new metal is well known, and I believe the general impression has been that the inferiority was due to the burning out of the phosphorus, as it is for this reason that the specifications of standard phosphor bronze call for a high percentage of phosphorus, in order to make provision for loss in remelting, and with the idea that the remelted scrap will still retain sufficient phosphorus not to deteriorate its qualities.

By my experiments I find this to be an entirely mistaken idea, because in the first place the phosphorus only burns off in very small proportions, when once thoroughly contained in the alloy; and, secondly, that the inferiority of the metal is directly due to the high percentage of phosphorus, for the reason that it combines with the tin and copper to

form hard crystalline phosphides, which are dissolved in the alloy when the metal is new, but separate or crystallize out in the old material.

Six hundred pounds of phosphor bronze was made of good selected material, and every precaution used in manipulating. It was then poured into ingots and borings taken from the first, middle and last ingots, the borings mixed and analyzed. The analysis showed:

Copper	78.72
Lead	9.89
Tin	10.58
Phosphorus	1.04

Three hundred pounds of these ingots was now weighed off and remelted, and again poured into ing-

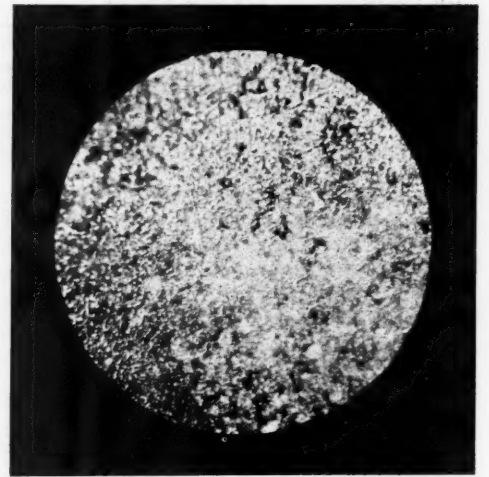


Fig. 3.—New Phosphor Bronze.

gots and weighed, and the loss carefully noted. The metal being melted and poured in this way ten times, and the loss noted on each heat, with the following results:

1st	3.5 pounds
2d	3.0 "
3d	3.0 "
4th	2.5 "
5th	3.5 "
6th	2 "
7th	3 "
8th	3 "
9th	4 "
10th	7 "

The total loss was 34.5 pounds, or 11.5 per cent. on the ten heats, and the average loss per heat 1.15 per cent. It will also be seen how uniform was the loss on every heat. The last heat only showing a considerable deviation, which I attribute to the metal being insufficiently hot to flow cleanly from the crucible, some of it sticking to its sides.

Borings were taken from the first, middle and last ingot of the 10th heat, well mixed and analyzed. The metal now contained its constituents in the following proportions:

Copper	80.23
Tin	10.40
Lead	8.35
Phosphorus87

The analysis shows that very little of the phosphorus has gone off, despite the fact that the metal was melted and poured ten times, the lead showing the greatest loss. The following table will show the loss in weight very closely, as shown by the analysis:

	1st heat.	10th heat.	Loss, in lbs.
Copper	235.47	213.41	22.06
Tin	29.67	27.61	2.06
Lead	31.74	22.17	9.57
Phosphorus	3.12	2.31	.81

These results show that the phosphorus is held in

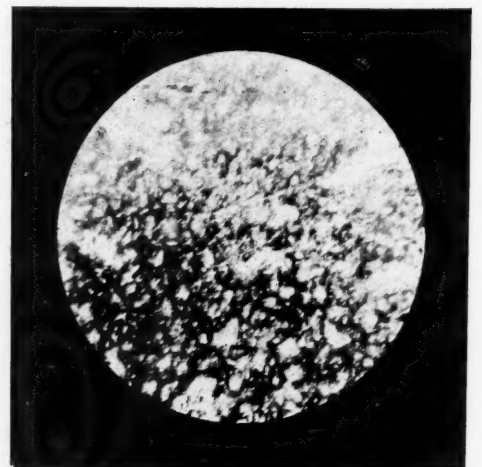


Fig. 4.—Old Phosphor Bronze.

bronze as in iron, i. e., in the form of phosphides, which high temperature can drive out only in very small proportions. To further investigate this point I examined the metal under the microscope and could there discern the crystalline phosphides of tin and copper. These crystals are intermixed or held dissolved in the new metal, but when subjected to re-

melting become organized and crystallize out in the alloy, forming hard spots and cutting surfaces, producing friction. The resulting metal after the 10th heat was decidedly crystalline and so hard it could scarcely be touched with a file.

Fig. 1—Shows the microscopic appearance of a bronze of same composition as the phosphor bronze, but without the phosphorus.

Fig. 3—Shows the new phosphor bronze, but very little separation of the phosphides having taken place.

Fig. 4—Is old phosphor bronze. In this metal the phosphides are no longer dissolved, but have a separated out as is shown by the large spots on the picture.

MICRO.

A correspondent writes: "I hardly think the experiments conclusive. I have no difficulty in using a greater or less percentage of phosphor-bronze scrap all the time, and do not strike metal so hard that it can hardly be touched with a file as is described. No doubt remelting ten times will give this metal, but I am doubtful as to the explanation. It is entirely possible that carbon from the pot may play an important part in this matter."

Another correspondent who has, perhaps, handled more phosphor bronze than any other one man living, says that this article "is correct in every detail."

Steamboats for the Yukon Trade.

We have lately heard a good deal about the novel submarine boat designed by Mr. J. P. Holland and built at the Crescent Shipyard, Elizabethport, N. J., of which Mr. Lewis Nixon is manager. Little has been said, however, concerning the work of Mr. Nixon in designing and building some special craft to ply on the rivers of Alaska and South America.

at the shipyard. The pontoons, cabin-sections, machinery, etc., will be shipped by rail to Seattle, and reshipped on steamers to St. Michael. As the harbor is shallow, the ocean steamers must anchor about a mile and a half from shore. The advantage of pontoon construction is therefore apparent since it makes possible the building of the boats at this distance from land, saving lighterage and construction of ways. The pontoons will simply be lowered to the water, floated into place and fastened with $\frac{3}{4}$ -in. bolts and side straps 36 in. wide by 7 ft. long. The bolt holes below the water line are filled with wooden plugs, which are replaced one by one with the bolts. The pontoons are made of steel plates $\frac{3}{8}$ in. thick riveted to the angles and beams with $\frac{1}{2}$ -in. rivets.

In the steamers, a feature has been introduced which is new to this country although used by Yarrow on two light-draft gunboats for the Nile. This permits the use of a comparatively large propeller in shallow water by means of a well, in which the propeller revolves. Thus, the steamer now building will have six submerged propellers 40 in. diameter, while her draft is but 30 in. It will be seen from the elevations that each of the six propellers is in a separate well of peculiar shape. The propeller, in revolving, gradually discharges the air from the well and the water then, sustained by the atmospheric pressure outside, completely fills the chamber, which is sealed, by the edges projecting into the water, against re-admission of air. Thus the propeller is working entirely in the water, while its real draft is reduced 10 in. The increase of skin friction caused by the large surface of the wells is offset by the increased efficiency of the propeller, since there is less slip when the water is confined than when it is free to move laterally. In the top of the well is a plate which may be removed when it is necessary to gain access to the screw.

have a long dining room 14 ft. wide, with 12 state-rooms 6 ft. x 6 ft. 3 in. on either side, and a 4 ft. guard or promenade outside of the cabin. The walls of the second-class cabin will be built flush with the side of the boat. Each fleet can accommodate 800 persons and 2,000 tons of freight.

The other boats in the shipyard are briefly as follows: Mercedes, stern wheel, 70 ft. long, 18 ft. beam, constructed in three pontoons. When loaded with 100 tons draws $2\frac{1}{2}$ ft. of water. Compound engines 7 in. and 12 in. with 28 in. stroke. She is built for Mr. Aug. Hanabergh, to be placed at Cartagena, U. S. Colombia.

Playaderro, stern wheel, 50 ft. long, 10 ft. beam. Engines 5 in. x 20 in. For Ecuador.

Alicia, side wheel, 32 ft. long, 8 ft. beam, 8 in. draft. Engines 5 in. diam., 20 in. stroke; Roberts boiler. For the Klondike trade.

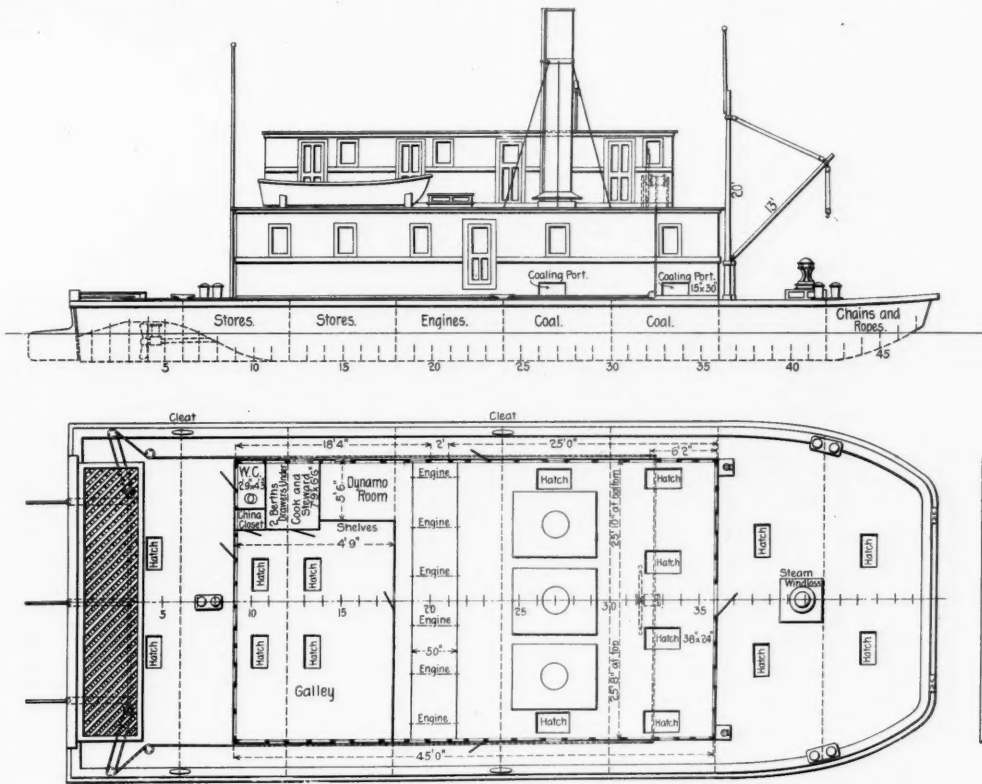
Amarillas, stern wheel, 70 ft. long, 15 ft. beam, drawing $2\frac{1}{2}$ ft. water when carrying 50 tons. Engines double, 7 in. x 28 in.; wood burning boiler. For the Yukon.

Ariquipa, 126 ft. long, 28 ft. beam, $2\frac{1}{2}$ ft. draft. Engines, 14 in. x 60 in.; 200 lbs. pressure; two Roberts boilers each 200 H. P. This boat will accommodate passengers and freight and will develop a speed of 10 miles per hour. She was built for Senor Belisario Olozaga for the Magdalena River.

Jennie M., stern wheel, 80 ft. long, 15 ft. beam. Engines 7 in. x 28 in., with wood and coal burning boiler. This steamer will carry an exploring party into Alaska in charge of Prof. Angelo Heilprin of the Academy of Natural Science of Philadelphia.

Alabama Railroad Commissioners' Report.

The Railroad Commissioners of Alabama, James Crook, Harvey E. Jones and Ross C. Smith, have is-



Six-Screw Towing Steamer for the Yukon.

Built at the CRESCENT SHIP YARD, Elizabethport, N. J. MR. LEWIS NIXON, Manager.

These boats are of interest to transportation men, owing to their carrying capacity and light draft, and interesting to engineers since high pressure engines and boilers are used, and because of other original features of design.

Sixteen of these craft are on the docks and under construction. The most interesting are the 10 boats, constituting two fleets, which the American Line will put on the Yukon early in June, thus completing a great transportation system from Europe to Alaska. Passengers may then journey from Southampton to New York, thence overland to Seattle, where they will live on the Connemaugh until transferred to one of the regular coasting steamers, Illinois, Indiana, Ohio or Pennsylvania, which again connect at St. Michael with one of the Yukon fleets, the whole journey being made under the American flag.

Each river fleet will consist of a steamer towing two freight and two passenger barges. Each of the towed barges may be considered as an assemblage of pontoons or rectangular boxes capable of floating independently, and of such shape that when joined together they form a moulded hull. In other words, the hull is formed in compartments with transverse planes every 10 feet.

The passenger boats have two decks and two sets of deck-houses. The freight boats have but one deck.

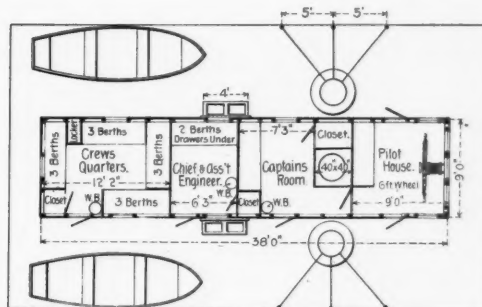
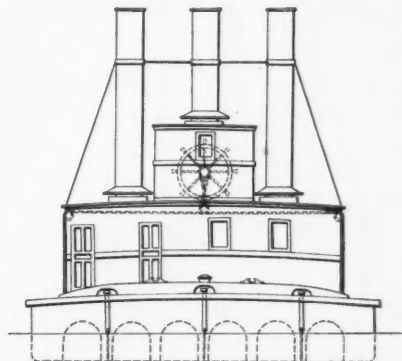
The cabins are built in sections, and assembled

Each screw is driven by a separate compound condensing engine of 133 H. P., designed and built by Samuel L. Moore & Son's Co., Elizabethport. The high pressure cylinder is 8 in. x 10 in., with piston valve. Beneath this is the low pressure cylinder 17 in. x 10 in., with slide valve, the whole resting on a base fastened to the keelson. The cylinders are of cast iron, the piston rods, eccentrics, crank shafts, etc., of cast steel, furnished by the American Steel Co., Thurlow, Pa. The cross-heads are of phosphor-bronze.

Steam is furnished by three Roberts boilers of 335 H. P. each, carrying steam at 225 lbs. per sq. in. The steamer carries 60 tons of coal in her bunkers and the first freight barge will carry 200 tons, so that the whole journey may be made without tying up for fuel, as other boats must do. The barge is provided with chutes which deliver the coal directly into the coaling ports of the steamer.

The steamer is 80 ft. long over all, 32 ft. beam, 5 ft. 6 in. deep, 30 in. draft. The general arrangement of cabins and equipment is clearly shown in the engraving.

The two barges which are towed next the steamer are for freight only; the last two barges for passengers. These boats are 100 ft. long (10 pontoons 10 ft. each) and 35 ft. beam. On the passenger barges the upper deck will be for first-class passengers, lower deck for steerage. The first-class cabin will



sued the 17th annual report of the Commission. It is dated Oct. 30 with statistics to June 30, 1897. The railroads suffered much from suspension of business on account of the yellow fever and were delayed in sending in their reports. The Commissioners have kept track of passenger and freight rates, but in view of the very moderate incomes of the companies have refrained from making reductions, "except where inequalities, due to discrimination, extortion and oppression," were found. The tone of this part of the report is somewhat apologetic, as though the people had expected greater things from the Commission. The physical condition of the roads of the state has been on the whole improved, the exceptions being one or two short lines with very small traffic.

The Commissioners regret that depot facilities do not meet the statutory requirements, though generally "the buildings are satisfactory to the people who use them." At Montgomery a new station has been finished, costing \$400,000, and the Commissioners regret that they cannot order the construction of a similar building in Mobile. Under the law they might order each company to put up a new station in that city, but the people want a union station, and so they find it necessary to depend upon persuasion instead of compulsion. Twenty-three passengers, 45 employees and 78 other persons were killed during the year and 42 passengers, 81 employees and 124 other persons were injured. Of the passengers, 22 were

killed at the Cahaba River bridge disaster Dec. 27, 1896. The Board found it impossible to ascertain whether this disaster resulted from defects in the bridge or was due to malicious derailment of the train, and they have appointed Prof. George S. Wilkins of the University of Alabama as consulting engineer to the Board to examine plans of all the railroad bridges in the state.

The length of new railroad built during the year was 34 miles and the total length of road in the state June 30, 1897, was 3,524 miles. Apparently, there are about 100 miles of road which is not used or which belongs to mining companies, etc., and is not included in the total of 3,524. The State Assessors appraised the property of the railroads for taxation at \$45,261,154, which is equal to 18 per cent. of the appraised value of all the property in the state.

About 800 pages of the report are taken up with detailed statements sent in by the railroad companies.

Minnesota Railroad Commissioners' Report.

The Railroad & Warehouse Commission of Minnesota, composed of Ira D. Mills, Nathan Kingsley and George L. Becker, has issued its 13th annual report. The statistics are for the year ending June 30, 1897. The length of railroad in the state at that date was 6,086 miles, an increase of 61 miles during the year. Statistics of earnings and expenses are given, said to be based on operations within the state of Minnesota. The principal totals are shown in the following table:

	1897.	1896.
Earnings, freight	\$28,840,441	\$31,314,098
" passenger	5,395,435	5,806,209
" miscellaneous	2,364,187	2,277,821
" total	36,600,063	39,398,128
Operating expenses	19,555,989	20,544,124
Net earnings	17,044,074	18,854,004
Per cent. of expenses	53.43	47.48
Taxes (year ending Dec. 31, '96)	\$1,037,194	\$1,009,224
Passengers killed	2	3
" injured	25	111
Employees killed	41	50
" injured	409	422
Others killed	88	72
" injured	102	75

The principal part of the report is taken up with

copies ordered sent to the Manhattan Company and certificates prepared for the acceptance of that company. The propositions drawn up by the Committee are printed below, nearly in full. We have omitted certain formal statements which are not essential to the understanding of the matter.

It will be observed that the Board presents seven distinct franchises which the Manhattan Company may accept as a whole, or any one of which may be accepted. The Board refrains from any requirement as to motive power in order to make it easier for the Manhattan Company to speedily provide the other additional facilities. One condition proposed is that grade crossings shall not be maintained either on the new routes, or at Chatham Square or at Fifty-third street and Ninth avenue. These are dangerous and inconsistent with high speed. "Such crossings in the existing system are responsible for large delay and their continued existence precludes any proper rapid transit." The seven franchises offered follow:

1. Two additional tracks from the City Hall along Park Row and the Bowery to Fifth street, the tracks to be so arranged at Chatham Square that there shall be no grade crossing, and at the City Hall station that passengers shall come in and go out on separate platforms, and that two of the tracks shall be used for express trains.

An original rental of 2 per cent. of the increase of the gross receipts at the stations between City Hall and Fifth street, including the City Hall station and the station at Fifth street, if one shall be placed there, over the gross receipts from said stations as reported for the year 1897. The Manhattan Company shall contract to complete the construction within two years.

2. A continuous third track from Fifth street to 129th street along Third avenue, with express stations at Twenty-third, Forty-second and 116th streets, and at such other streets as the Board may designate; but such stations to be so arranged that express train may remain on the centre track while taking on and discharging passengers. For this franchise an original rental of 2 per cent. of the increase of gross receipts at the stations between Fifth street and 129th street, not including the station, if any, at Fifth street, but including the station at 129th street, over the gross receipts from said stations as reported for the year 1897.

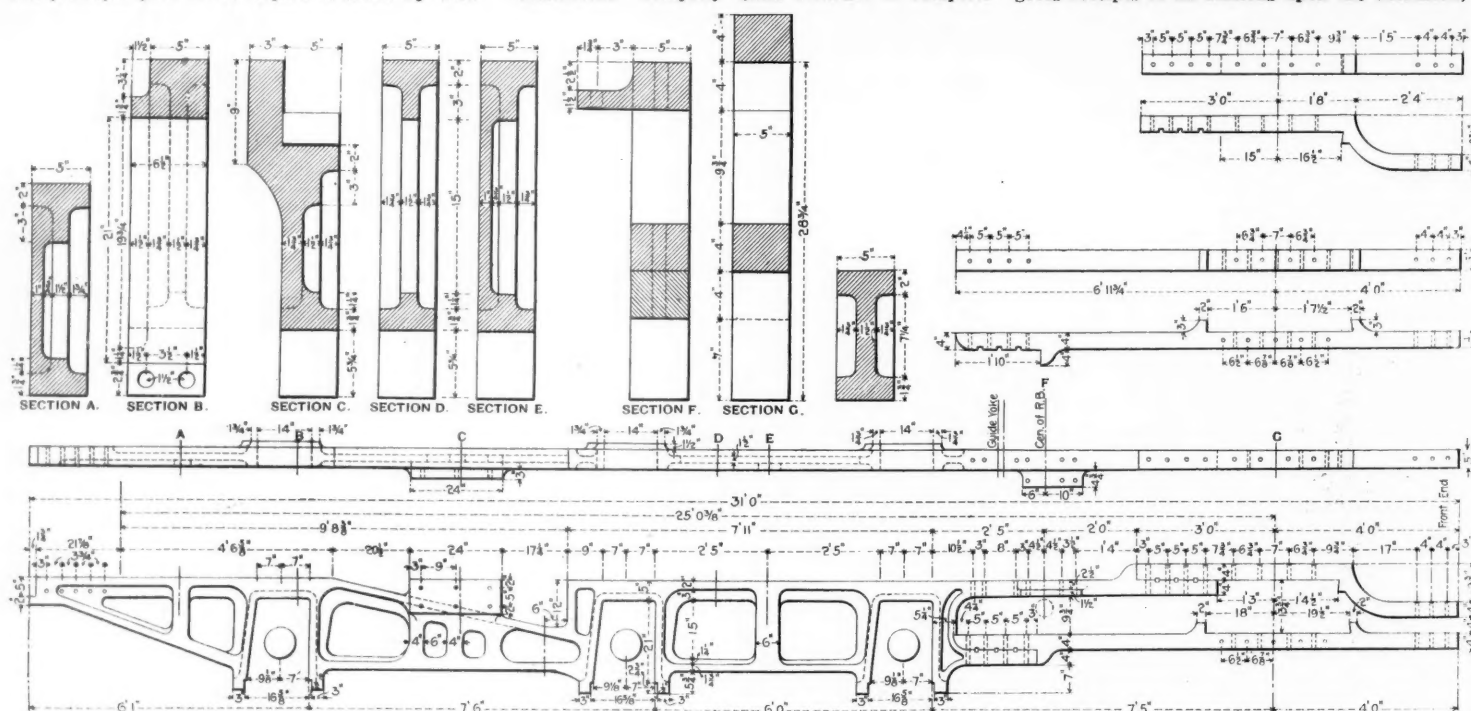
Manhattan Company shall contract to complete

shall be overhead; and as to further require that the northbound track of the new line shall be carried over the existing Sixth avenue line at Thirteenth street, and run to a connection with the corresponding track of the Sixth avenue line without a grade crossing of the southbound track. We propose that the original rental for this franchise shall be 5 per cent. of the gross receipts at all stations upon the route. The construction shall be completed within three years after receiving the permission.

6. The construction of the City Hall branch along Centre and Canal streets, as proposed in the Manhattan application, except that the route shall be diverted from Canal street at Watts street and run westerly along Watts street to West street, in order to make direct communication with the Desbrosses street ferry, and except that the line shall be carried over the existing Sixth avenue line at West Broadway and Canal street, and that if a physical connection between the two lines shall be desired, the same shall be so arranged as to avoid any grade crossings; and except that it shall be carried over the existing Ninth avenue line; and except that there shall be no columns between the building lines on Broadway.

For this franchise we propose an original rental of 5 per cent. of the gross receipts at all stations upon the route, including the proposed new station at the City Hall. The construction should be completed within three years.

7. A route beginning at the intersection of Ninth avenue and Fifty-third street, thence along West Fifty-third street to Tenth avenue; thence along Tenth avenue to a point at or within 200 feet of the centre line of Fifty-sixth street; thence to be carried by tunnel under Tenth avenue, otherwise called Amsterdam avenue, to a point between Fort George and Dyckman street, and thence by viaduct over and along Tenth avenue, otherwise called Amsterdam avenue, to its intersection with King's Bridge Road, and thence over and along King's Bridge Road to King's Bridge, with the option to the Manhattan Company to construct a viaduct over the Manhattan Valley, instead of a tunnel beneath the same, but no permanent interference to be permitted with the surface of Tenth (Amsterdam) avenue south of the north building line of 122d street, or between the south building line of 135th street and a point — feet south of Dyckman street. The tunnel above provided for should be sufficiently deep to allow another tunnel to be built over it at the intersection of Tenth avenue and the Boulevard, and also to allow of a substantially level track from Fifty-sixth street to Dyckman street. For this franchise we propose an original rental for the first year of 1 per cent. upon the gross receipts of all stations upon the extension; for



Design for Cast Steel Locomotive Frame, by Mr. R. M. Galbraith, General Master Mechanic St. Louis Southwestern Railway.

detailed accounts of the hearings, etc., before the Commission. The decision of the Supreme Court of the state in the Steenerson case, sustaining the State Railroad Commission in ordering a reduction of freight rates on the Great Northern Railway, is given in full. It occupies about 40 pages.

The more important statistics of the roads of the state are given in tables, which show the totals for each road. These tables include average rates per passenger mile and per ton mile on each line for 10 years. The report of the grain inspector takes up about 40 pages.

Design for a Cast Steel Locomotive Frame.

The engraving herewith shows a design for a cast steel locomotive frame sent to us by Mr. R. M. Galbraith, General Master Mechanic of the St. Louis Southwestern Railway. The frame is shown in detail, with complete dimensions, and obviously any description is uncalled for.

Rapid Transit in New York.

On the 17th the Contract Committee of the Board of Rapid Transit Commissioners brought in a report specifying certain propositions which it was recommended that the Board should make to the Manhattan Railway Company. The report was accepted,

the construction within one year after receiving the permission. This franchise should also include a requirement that the Manhattan Company improve the 129th street terminus at Third avenue so as to avoid the existing congestion and delay, and to permit the running of through trains in connection with the present suburban branch of the Manhattan Railway.

3. The northern extension of the east side line to Bedford Park as proposed in the application of the Manhattan Company of Jan. 31. The original rental for this franchise should be 5 per cent. upon the gross receipts of all stations upon the extension. The extension should be built within two years after permission.

4. A continuous third track on the Ninth and Eighth avenue line from Rector street to 159th street, with the provision for at least five express stations, to be located by the Board; but such stations to be so arranged that trains may remain on the centre track while taking on and discharging passengers, and the tracks at Fifty-third street and Ninth avenue to be so arranged as to eliminate grade crossings. For this franchise we propose an original rental of 2 per cent. of the increase of the gross receipts of the stations between Rector street and 159th street, including the stations at those two points, over the gross receipts at such station as reported for the year 1897. Construction should be completed within one year.

5. The construction of the West street and ferry connecting route, as proposed by the Manhattan Company, modified, however, so as to require the inclusion therein of a loop at Battery Place with the Sixth and Ninth avenue lines, which shall not occupy any portion of Battery Park; and as to further require that the crossing of the existing Ninth avenue line at Horatio or Gansevoort street by the new line

the second year, of 2 per cent. upon the like gross receipts; for the third year, of 3 per cent.; for the fourth year, of 4 per cent., and for each succeeding year, of 5 per cent. The extension should be built to Dyckman street within three years after the permission of the municipal authorities shall be obtained, and to King's Bridge within two years more.

Electric Circuits for Automatic Block Signals.*

In selecting a method of operating automatically a system of block signals there are two important views to take on the subject:

First, does the system fulfill the requirements under normal conditions?

Second, does it give the same degree of safety under abnormal conditions?

However well installed and maintained, a system will be thrown out of balance at times by unforeseen events or by unavoidable circumstances. . . . Experience shows that a large proportion of the men maintaining block signals to-day know but little of the fundamental principles upon which they operate, have only a vague conception of the circuits controlling them and can give a comprehensive and satisfactory reason for the arrangement of circuits, when known, only in rare cases. Reports of failures in the apparatus made by these men rarely cover the situation fully. . . . Lightning, in certain localities, has proved one of the most serious and frequent sources of trouble known to the successful operation

*From a pamphlet on the Disadvantages Attending the Operation of Automatic Signals on the Normally Danger System, published by Mr. J. P. Coleman, Assistant Engineer of the Union Switch & Signal Company, Swissvale, Pa.

of automatic signals. Much time and money has been spent to reduce its influences, and much progress has been made in this direction, but the problem is not entirely solved yet. The great danger to be feared is the fusing of relay contacts together, so that the signal circuit passing through them will not be opened when a train entering a block section demagnetizes the relay controlling them. Fuse wires of low carrying capacity inserted in the signal circuit, and which are designed to "blow" before the contacts of the relay fuse, are in common use; but these offer only a degree of protection, since relay contacts, if dirty and of high resistance, will fuse with a current at high potential that may be too low in volume to blow the fuse. Great annoyance also results from their use, since when "blown" these fuses cause the signal to stand at danger until they are renewed; and in heavy storms this becomes so frequent that many trains are held unnecessarily and a degree of danger to trains results from these delays. Arresters that are fairly reliable are also provided for high potential discharges, and a combination of these and the fuse wires gives a high degree of protection for extreme cases, but for protection against discharges of moderate potential and volume no arresster has yet proved entirely satisfactory.

The most careful treatment of magnet cores and of armatures cannot remove entirely the natural tendency of all iron when magnetized to retain a small portion of residual magnetism. Cores practically free from this influence have been known to acquire a tendency to remain partly magnetized when the current through their coils was removed after being some time in actual service. This probably resulted from lightning. Whatever the cause, the evil exists. It may be overcome by care in the adjustment of relay cores and armatures to each other, but a relay thus affected, if improperly adjusted, may not drop its armature and open the signal circuit when a train covers the section controlling it. If the contacts were fused together by lightning, a like condition would exist; thus two causes may produce the one result of a relay not operating by action of a train on its track section; both remote, but both possible nevertheless. It is the intention, after having shown some causes of relay failures, to show how much more seriously the failures affect the normally danger system than they do the normally clear system.

Diagram A represents the circuits employed by the Union Switch & Signal Company in their applications of the normally clear system of signalling on double track roads, where home and distant signals are used. Diagram B represents the same system modified to operate on the normally danger plan. Diagram C represents the essential elements of the circuits installed by the Hall Company on the Illinois Central Railroad, its chief difference from plan B being that the distant signals are not dependent upon the position of their home signals.

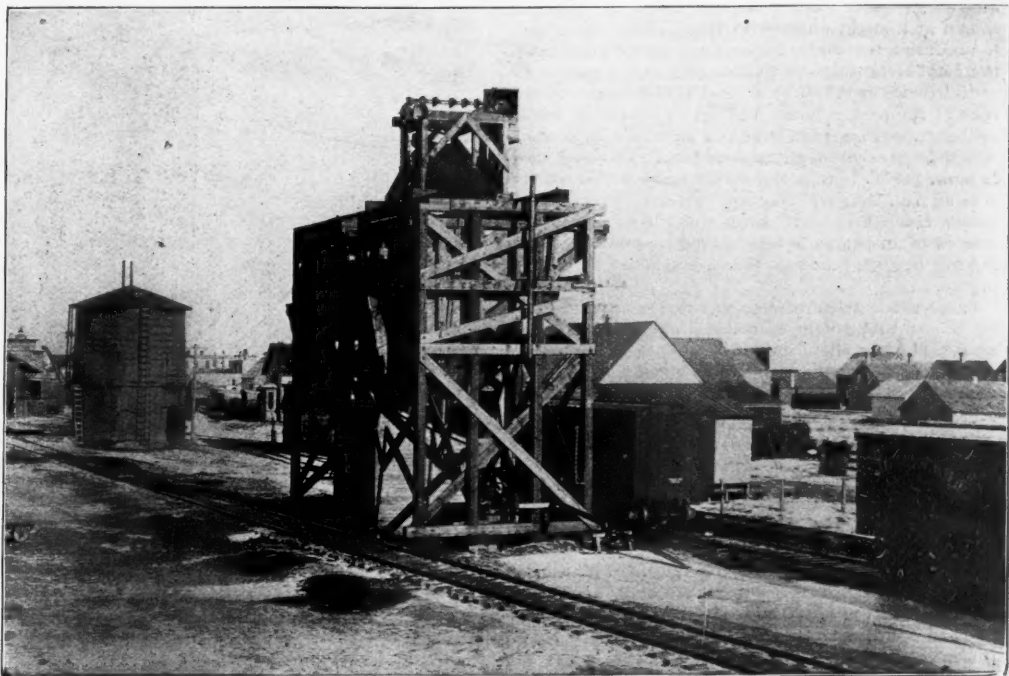
It will be evident from diagram A that in the event of any relay contact fusing closed, the signal controlled by that contact will remain at clear while a train covers the particular track section controlling that contact. Thus if relay b does not operate to open the signal circuit by the entrance of a train on to section B', the signal may be seen by the inspector or trainmen to stand at clear behind the train, and the necessary steps may be taken to protect the train until the error is remedied. Under the normally danger system, diagrams B and C, a similar condition of the corresponding relay c would produce a like condition of the signal until the rear end of the train passed the signal, whereupon the signal would be put to danger by act of the relay a (the "clearing" relay) breaking the circuit controlling the signal. An observer of the signal's movement might easily be left with the impression that the signal was put to the danger position by virtue of the train's entrance to the block governed by it, whereas the fact is the signal would be restored to danger by the exit of the train from the section in the rear of the signal, and a following train would, under this condition of the relay, clear the signal for its own approach into the block occupied by the first one. Thus this method of operation involves the danger of inspiring a false sense of security in trainmen and others at times of great peril. Furthermore, if the train is followed through the block, it will be found stopped at signal 2 for the reason that the relay (not having operated as stated) did not clear that signal as it does under normal conditions. It is evident, therefore, that a single relay failing as stated may cause a train to come to a regulation stop at the en-

There are also other reasons for preferring the normally clear system. Misplaced switches, broken rails, wires, batteries and other connections give instant evidence of their derangements, by putting to danger the signals of the blocks in which they are located, and repairs may often be made in time to avoid delays to trains by reason of timely warning thus given inspectors, trackmen, operators and stationmen.

In the normally danger system no evidence is given by the signal of the block affected of trouble until a train is stopped through its inability to clear that signal. Evidence of derangements are made apparent, however, in some instances by the movement to safety of the signal of the block ahead of the one in which the trouble exists, and which should be in no way affected by the occurrence. Since in this system the movement of a signal to clear also de-

employed has much to do with its likelihood of sticking at clear. Semaphore signals of the ordinary design are likely to stick thus if not provided with enormous counterweights. If proper care and intelligence is used in the design of a semaphore signal for automatic service, this likelihood is practically eliminated, and no longer forms a valid reason for signals standing normally at danger.

Economy of battery is another reason advanced for holding signals at danger normally. Batteries used on the track circuits are subject to the same conditions exactly in the two systems. The batteries used on the local or line circuits of the normally clear system will, theoretically, require renewals oftener than those used on like circuits under the normally danger system. There is not yet developed, however, a primary battery that will stand continuous duty on signal circuits, however they may be arranged



A Small Coaling Station on the Northern Pacific Railway.

notes the approach of a train, it is not to be depended upon as an index of trouble.

Signals standing normally at clear give desirable evidence of the active condition of all elements controlling them from all points from which they are visible. Thus, observers either on trains, in stations, towers or other locations may readily ascertain the condition of the signal system. This is material to inspectors on moving trains on two and four-track roads, where the action of the train gives the desired evidence of the condition of the signals of the track upon which it is running, and the view of the signals of other tracks enables one to determine the condition of those. Inspectors on the track may ascertain the proper or improper operation of the system by moving switches, relays, etc., by hand and by opening and closing track and signal circuits in advance of the signals, looking for the effects of their tests to the signal itself—the simplest and safest method of performing this work.

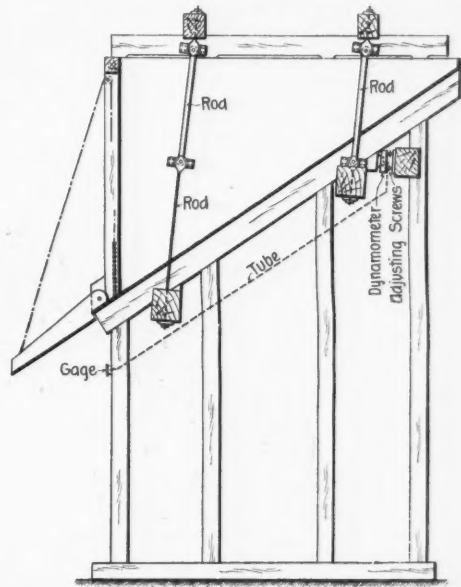
Since signals standing normally at danger cannot be cleared by any means located in advance of them, tests of this character cannot be made save by the co-operation of two inspectors, one in advance and one in the rear of the signal tested, the rear one holding the signal at clear while the one in advance tests, as under the normally clear system. This method is most unsatisfactory on long blocks, owing to the distance separating the two men, and to the likelihood of misinterpretation of results due to train influences.

normally, for over a year without exhaustion from intermittent duty and local action. And we have yet to meet the signal engineer who will demand a longer life of batteries for this purpose. . . .

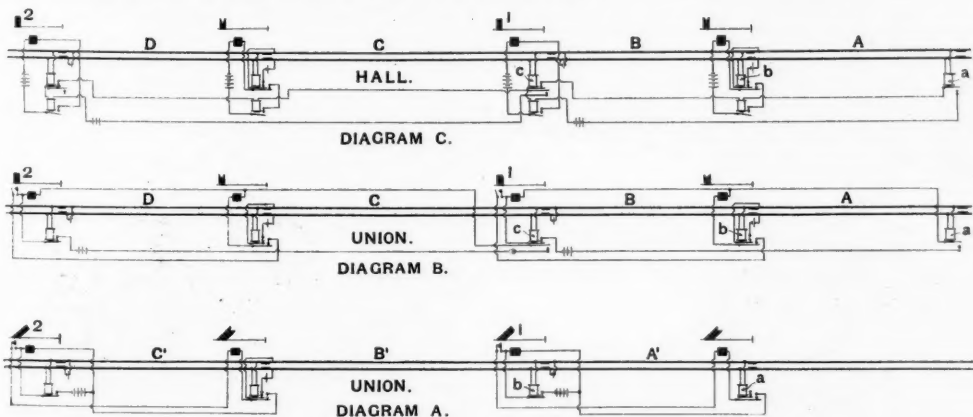
A Small Coaling Station—Northern Pacific Railway.

The accompanying engravings show a small two-pocket coaling station designed by Mr. E. H. McHenry, Chief Engineer, and erected on the Winnipeg Branch of the Northern Pacific Railway at Drayton, N. D., a number of which plants have been built at points where few engines are coaled daily.

Any class of locomotives can take coal at these stations. The length of the station illustrated, measured along the main track, is 40 ft., while the distance between the main track and the siding in the rear



Automatic Weighing Device for Suspended Pocket.



Electric Circuits for Automatic Block Signals.

trance of an unoccupied block, while it permits a second train to enter the occupied block with the assurance from a clear home and a clear distant signal that the block is unobstructed.

There are reasons, too, why normally danger systems are more susceptible to relay failures, than are normally clear systems. They invariably introduce an extension of signal circuits (line wires) beyond the limits of those employed by the other method, and are, therefore, more readily affected by storms and lightning. They necessitate the use of back points on relays which can never be given the contact pressure secured in front points. They are, therefore, less reliable than front contacts, and front contacts do sometimes give trouble. Furthermore, these back contacts are additional to the front contacts required by the normally clear system in all cases.

Why should an automatic signal be made to indicate a block to be occupied or unsafe for traffic at a time when it is known to be unoccupied and entirely safe for traffic? What danger results from having a signal indicate "block clear" when it is clear, or what, other than complication, is secured by withdrawing this information at a time which offers the opportunity, and its display the means of an intelligent and comprehensive test of the system by those entrusted with its care? And of what value is a system incapable of this attention? One of the reasons for holding automatic signals normally at danger is undoubtedly the fear of their freezing or otherwise sticking in the position they longest rest in; and signals standing at clear normally do rest at clear a longer portion of a given period than do those standing normally at danger. The form of signal

of the pockets is 33 ft. 10 in., so that it will be seen that very little space is occupied by the plant. Cars loaded with coal are placed on the siding in the rear from which the coal is unloaded into the hopper of the elevator, drop bottom coal cars being used for this purpose as far as possible, as in this way much manual labor is saved. From the hopper the coal is elevated to the top of the building and discharged into a chute which in turn delivers the coal to either pocket as desired; the hoisting capacity of the conveyor machinery is $\frac{1}{2}$ ton per minute, the machinery being driven by a $2\frac{1}{2}$ H. P. gasoline engine. The operating machinery was installed by the Link-Belt Machinery Company, Chicago.

Each pocket has a capacity for 35 tons of coal, while the hopper has a capacity for an additional 35 tons and a reserve supply is provided by keeping a number of extra loaded cars on hand. When coal is received in drop or hopper bottom cars, but one man is required to tend the plant and he also takes care of the water station and cinder pit. A modification of this plant is used at more important points, having a greater number of pockets as required which are served by a longitudinal chain conveyor running over the whole line of pockets.

One of the interesting features of these coaling plants is the automatic weighing device, which is shown by the engraving, and was designed by Mr. McHenry. Each pocket is suspended on rods as shown at a slight angle with the vertical, calculated to produce a horizontal thrust equivalent to one-tenth the total weight of the pocket and load. This horizontal thrust is taken by a fluid dynamometer at the rear of the pocket, while the fluid pressure is transmitted through a small tube to a gage placed in front, which is graduated directly in tons. The coal gate is arranged so that it can be operated to cut off the coal at will, thus allowing any quantity of coal to be drawn from the pocket, while the weight of coal delivered to an engine is ascertained by taking the difference in gage readings before and after the coal is drawn.

These small mechanically operated coaling stations have been found both economical and convenient, as such a plant, while occupying but little space, is the equivalent of a very large coal wharf as ordinarily constructed.

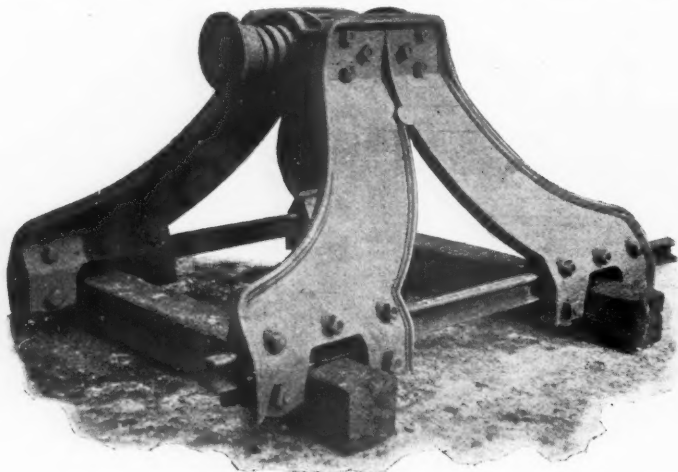
The Lamb Woven Wire Fence.

The Lamb Wire Fence Company, Adrian, Mich., is putting on the market a new woven wire fence, which combines the essential features necessary for a fence intended for turning stock. Four sizes of this fencing are carried in stock suitable for railroad work, which have 14 straight uprights, of No. 11 wire, to each rod of fence, while the lateral wires are of hard spiral spring steel; the top wires are No. 7, the intermediates No. 11, and the bottom wires No. 9, all wires being thoroughly galvanized. A 58-in. fence is made with either 13 or 11 horizontal wires, the 54 in. fence has 10 and the 50 in. 9 laterals.

A special feature of the Lamb fence is the staple joint used where the upright and lateral wires cross, which is shown in the illustration. This joint gives a smooth fence, and at the same time forms a lock that prevents slipping of the wires in either direction. By this means the full strength of the component wires is preserved, as they are not kinked or bent at the joints, and the large size, straight verticals make a stiff construction. Gates with single or double frames are made in a similar manner to correspond to the fences described.

The Haley Bumping Post.

The accompanying engraving shows the Haley metal bumping post, now being put on the market, which overcomes many of the objectional features of wooden posts. This post is built up of heavy flanged castings made from semi-steel, a tough material which shows on test a tensile strength of about 35,-



The Haley Bumping Post.

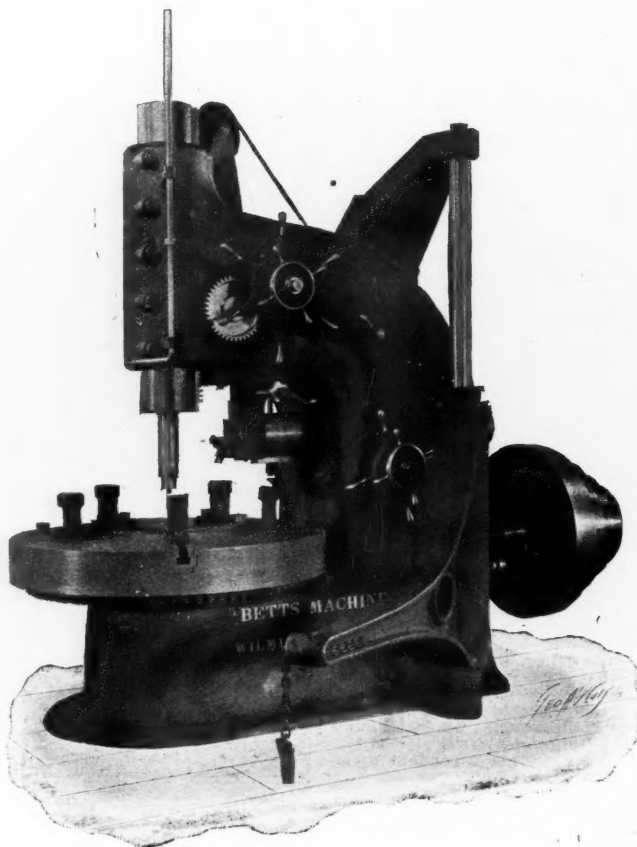
000 lbs. per sq. in. As shown, the post is designed with a broad base, so as to prevent overturning, while the lower ends of the frame are made to conform to the outer contour of the rails, coming down well around the ties; a similarly shaped cast plate is placed on the inner side of the rail, which is secured to the main frame by means of three bolts above and two beneath the rail, thus making a strong connection between the post and the track. The impact from cars is received on a plunger, guided in a cylindrical casting, and the blows are taken up by

means of two double coil springs which reduce the intensity of shocks coming on both cars and bumping post. No excavation is needed to place this post, and if required it can be transferred from one track to another with little labor.

A Haley bumping post has been in hard service in the Kinzie street yard of the Chicago & Northwestern, Chicago, for over three months and shows no

rapid hand movement is also provided for each. The facing head slide has 7 in. travel and a square guide.

The Lobdell Car Wheel Company, for whom the first of these machines was built, say that the facing attachment is a great help. They have bored and faced as many as 50 wheels in a day of nine hours with this mill, the average output of their other mills



52-In. Car Wheel Boring Mill.

signs of injury and no repairs have been needed in this time.

These posts are now being made by the Semi-Steel Company, the King & Andrews Company, Proprietors, of Chicago. Two sizes are built, one for passenger and one for freight tracks, and both are neat and substantial.

A New Car Wheel Boring Mill.

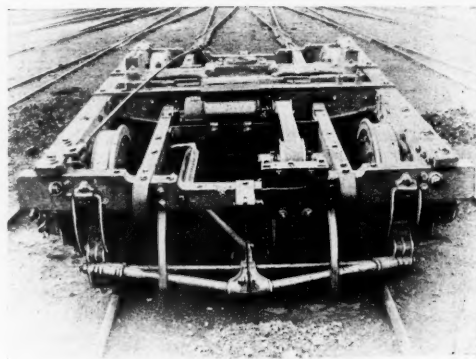
The illustration shows a 52-in. car wheel boring mill lately designed and built by the Betts Machine Company. It is a very rigid and powerful machine and has several improvements. The facing head is supported close to the cut, permitting heavier cuts to be taken and is so built that it can be slid back entirely out of the way when chucking the largest wheels. The workman controls the machine from one position and all adjustments are easily and quickly made. The chuck is 52 in. in diameter with

for the same work being about 28 wheels. The wheels are bored dead true, and owing to the weight and stiffness of the machine it is probably less liable to get out of order than the ordinary mill.

Car Lighting from the Axle.

The engravings show in a general way the installation of the generator machinery on the trucks of the cars of the Atchison, Topeka, & Santa Fe for lighting from the axle. There are now 54 cars in service so equipped on that line. One of the engravings shows the equipment on a 6-wheel truck and the other on a 4-wheel truck, the arrangement being practically the same.

The Santa Fe is considering the use of this same light for tail lights, and has made tests in the Topeka yards with this light for locomotive head lights, the intention being to equip a locomotive with one standard light installation, and besides supplying a powerful incandescent head light for the locomotive and electric light for the cab, provide also, by flexible connection, at least two of the baggage and ex-



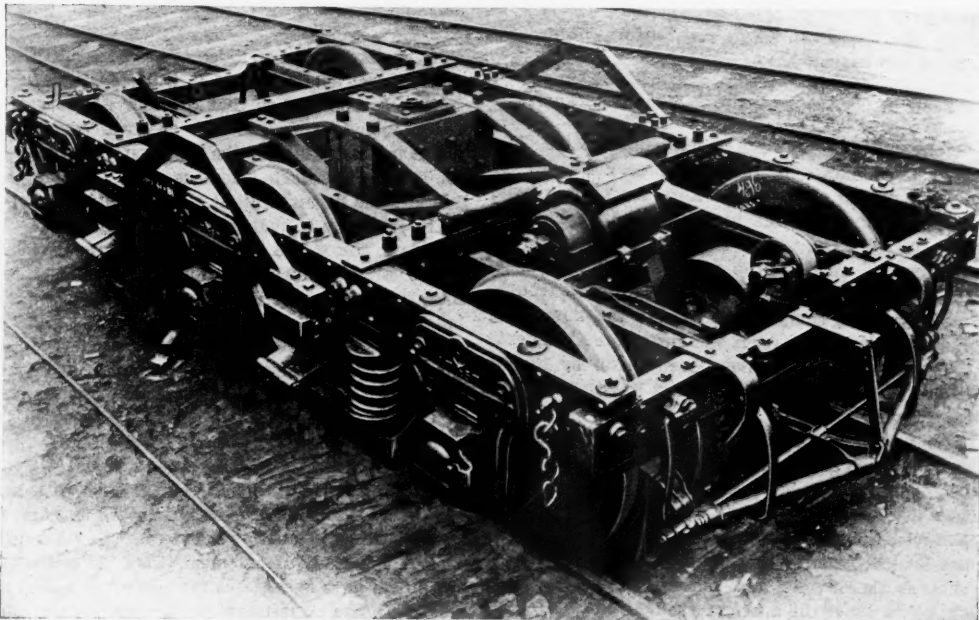
press cars immediately behind the engine with electric light.

The three United States Postal cars, of the Santa Fe, equipped with this light, are running between Chicago and Kansas City. These cars are equipped with 24, 16-candle power lights each. They stand in the Santa Fe station at Chicago every night from 6 o'clock p. m., until 2:30 a. m., burning full light. They then run to Kansas City, using full light until daylight, arrive there at 2 p. m. the following day and start immediately on the return trip at 6:20 p. m. of the same day.

The system is now completely organized on the Santa Fe. Every employee of the train service and

mechanical department has been furnished with a list of questions and answers, on which he is required to pass examination. Whenever the train is inspected the inspectors are instructed to examine the countershaft and dynamo bearings, and if found hot, they are required to oil them. Every car carries an extra belt, and if another is wanted, the conductor tele-

Outside lap of slide valves.....H. P. 1 1/4 in. L. P. 1 1/4 in.
Inside lap of slide valves.....1/4 in. clearance
Kind of valve stem packing.....U. S. Metallic
Wheels, Etc.
Diameter of driving wheels outside of tire.....63 in.
Mat'l of driving wheels centers.
Main, cast steel; F. and B. steeled C. I.
Tire held by.....Shrinkage
Driving box material.....Gun iron



Atchison Truck Equipped for Axle-Lighting.

graphs to the nearest belt station and an employee of the mechanical department puts the extra belt on. The National Electric Car Lighting Company is now putting equipment on the Long Island Railroad, and propositions for the introduction of this light are under consideration by the St. Paul & Duluth, the Missouri Pacific, the Canadian Pacific, the Wabash and other Western railroads.

Schenectady Compound Ten-Wheelers for the Boston & Maine.

Below is the descriptive specification of one of a lot of ten, compound, ten-wheel freight locomotives which the Schenectady Works are building for the Boston & Maine Railroad. The locomotives are being built from drawings and specifications prepared by Mr. Henry Bartlett, Superintendent of Motive Power, and are designed for freight service on the Concord and White Mountains divisions, both of which are more or less hilly. Four of the engines have been de-

Diam. and length of driving journals.....8 in. dia. x 10 in.
Diam. and length of main crank pin journals.
Main side 6 1/4 in. x 5 1/4 in. Main 5 1/2 in. dia. x 6 in.
Diam. and length of side rod crank pin journals.
F. & B. 4 1/2 in. dia. x 4 in.
Engine truck, kind.....4-wheel, swing bolster
Engine truck journal.....5 1/2 in. dia. x 10 in.
Diameter of engine truck wheels.....30 in.
Kind of engine truck wheels.
Standard, O. H. steel, tired spoke center
Boiler.
Style.....Extended wagon top
Outside diameter of first ring.....58 in.
Working pressure.....200 lbs.
Mat'l of barrel and outside of firebox.....Carbon steel
Thickness of plates in barrel and outside of fire
box.....9-16 in., 3/8 in., 11-16 in. and 1/2 in.
Horizontal seams.....1/8 in., 3/8 in., 1/2 in. and 3/4 in.
Butt joint, sextuple riveted with welt strip inside
and outside
Circumferential seams.....Double riveted
Firebox, length.....96 in.
" width.....42 1/2 in.
" depth.....F. 70 in.; B. 61 in.
" material.....Carbon steel
" plates thickness.....
sides 3/8 in., back 3/8 in., crown 3/8 in., tube
sheet 1/2 in.
" water space.....
4 in. front, 3 1/2 in. sides, 3 in. back.

Tender frame.....8 in. steel channel
" trucks.
Co.'s style, arch bar type, wood bolster, side bearing
Water capacity.....4,000 U. S. gallons
Coal capacity.....8 tons
Total wheel base of engine and tender.....49 ft. 11 1/4 in.
Total length of engine and tender.....59 ft. 4 1/2 in.
Engine equipped with:
Two 3-in. Ashton safety valves.
One Selbert triple and one Nathan triple sight feed
lubricators.
American outside equalized brake on all drivers.
Westinghouse aut. air brake on tender and for train.
Magnesia lagging on boiler.
National hollow brake beams.
16 in. round case headlight.
Crosby No. 3, 5-in. chime whistle.
Crosby thermostatic steam gage.
Consolidated steam heating apparatus.

Train Accidents in the United States in February.

COLLISIONS.

Rear.

1st, on Chicago Great Western, at Fredericksburg, Ia., a freight train standing at the station was run into at the rear by a following freight and the engine and several cars were wrecked. Two trainmen were badly scalded, one of them fatally, and 2 passengers were injured. There was a blinding snowstorm at the time.

3d, on Union (Elevated) Loop, at Fifth avenue and Washington street, Chicago, a passenger train of the South Side road ran into the rear of a passenger train of the Metropolitan, damaging the engine and 1 car.

3d, on Boston & Maine, at Winter Hill, Mass., a passenger train ran into the rear of a preceding passenger train, badly damaging 1 car. Eight passengers were injured. The second train was running at 10 miles an hour and the foremost one was standing at the station. The automatic block signals were at danger in consequence of disarrangement of wires by a severe snowstorm and the second train appears to have been run too fast where the rules required it to be run under control.

4th, on Fitchburg road, at Porter's, Mass., a local passenger train just starting from the station was run into at the rear by a following express passenger train and 1 car was badly damaged. One passenger and a fireman were injured. The express disregarded an automatic block signal which indicated "stop."

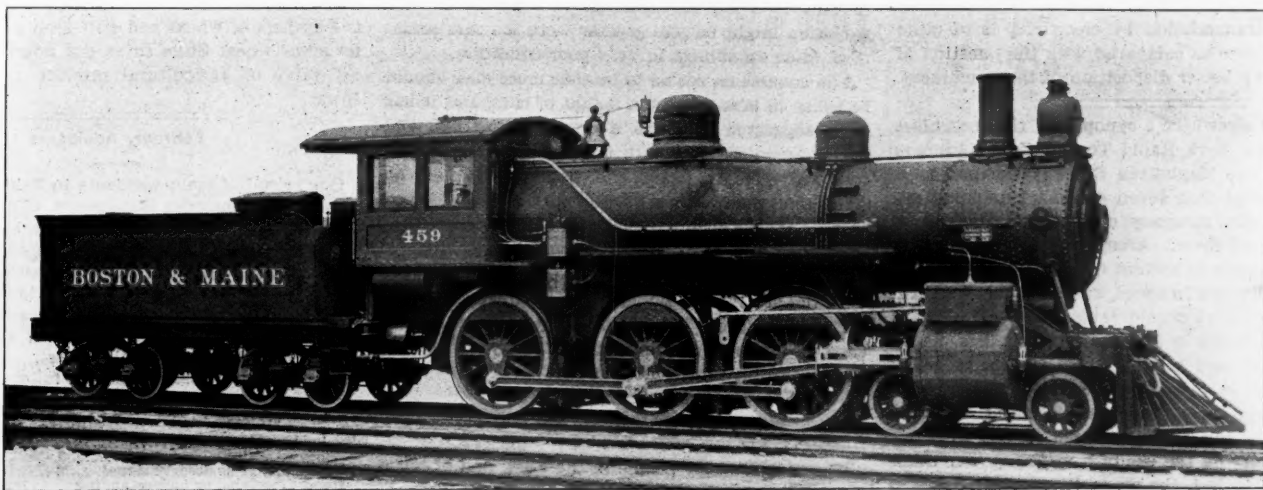
4th, on Houston & Texas Central, near Brenham, Tex., a mixed train broke in two and the rear portion afterward ran into the forward one, damaging the baggage and smoking cars. The baggageman was injured.

5th, on Cleveland, Cincinnati, Chicago & St. Louis, near Mahanville, Ind., a mixed train broke in two and the rear portion afterward ran into the forward one, derailing and ditching several cars. The express messenger was injured.

9th, on Manhattan Elevated, Third Avenue Line, near Forty-second street, New York city, a passenger train ran into the rear of a preceding passenger train, damaging the engine and 2 cars. There was a dense fog at the time.

About eight minutes after the collision above mentioned a third train ran into the rear of the second, damaging the engine and 1 car. The fireman was scalded and otherwise injured. There was a panic among the passengers and some of them were slightly injured.

9th, on Chicago, Peoria & St. Louis, near Oakford, Ill., a freight train ran into the rear of a preceding freight, which was entering a side track, and 15 cars were badly damaged. The engineman was killed. There was a dense fog at the time.



Schenectady Compound Ten-Wheeler for the Boston & Maine.

livered and are now entering service and give promise of very satisfactory results.

10-Wheel Compound Locomotive Engine for the Boston & Maine.

General Dimensions.

Gage.....4 ft. 8 1/2 in.
Fuel.....Bituminous coal
Weight in working order.....141,000 lbs.
" on drivers.....103,000 lbs.
Wheel base, driving.....14 ft.
" rigid.....14 ft.
" total.....24 ft. 5 in.

Cylinders.

Diameter of cylinders.....H. P. 21 in. L. P. 32 in.
Stroke of piston.....26 in.
Horizontal thickness of piston.....5 1/4 in. and 4 1/4 in.
Diameter of piston rod.....3 1/2 in.
Kind of piston rod packing.....C. I. Rings
Kind of piston rod packing.....U. S. Metallic
Size of steam ports.
H. P. 20 in. x 2 1/2 in. L. P. 23 in. x 2 1/2 in.

Size of exhaust ports.
H. P. 20 in. x 3 in. L. P. 23 in. x 3 in.

Size of bridges ports.....1 1/2 in.

Valves.

Kind of slide valves.....Allen-Richardson, balanced
Greatest travel of slide valves.....6 in.

Firebox, crown staying.
" stay bolts.....Radial stays 1 in. and 1 1/4 in. diam.
" stay bolts.....Ulster special run
Tubes, material.....Charcoal Iron No. 12, B. W. G.
" number of.....267
" diameter.....2 in.
" length over tube sheets.....13 ft. 4 in.
Fire brick, supported on.....Studs, Co.'s style
Heating surface, tubes.....1,852.33 sq. ft.
" firebox.....141.4 sq. ft.
" total.....1,993.73 sq. ft.
Grate surface.....27.39 sq. ft.
" style, finger type, rocked in two sections.
R. R. Co.'s style
Ash pan, style.....Hopper
Exhaust pipes.....Single
" nozzles.....5 in., 5 1/4 in. and 5 1/2 in. dia.
Smoke stack, inside diameter.....15 1/2 in.
" top above rail.....13 ft. 9 in.
Boiler supplied by
2 Hancock Type "B" Improved Inspirators size No. 8

Tender.

Weight, empty.....34,000 lbs.
Wheels, number of.....8
" diam.....33 in.
Journals, diam. and length.....4 1/4 in. dia. x 8 in.
Wheel base.....15 ft. 8 in.

11th, on Philadelphia & Reading, near Wernersville, Pa., a freight train ran into the rear of a preceding freight, damaging the engine and several cars. The fireman was injured.

16th, on Boston & Maine, at Wyoming, Mass., a passenger train standing at the station was run into at the rear by a following freight train, damaging 1 passenger car and an engine and wrecking 2 freight cars. There was a blinding snowstorm at the time. The baggageman and 2 passengers were slightly injured.

16th, on New York, New Haven & Hartford, at Quincy, Mass., a freight train ran into the rear of a work train, badly damaging several cars, some of them being overturned in the ditch. The engineman of the freight was injured. There was a blinding snowstorm at the time.

22d, 11 p. m., on Pennsylvania road, at Valley Creek, Pa., an eastbound freight train descending a grade broke in two and the rear portion afterward ran into the forward one, making a bad wreck. A part of the wreck fouled the westbound track and a freight train on that track ran into it, so that altogether 22 cars were wrecked. One trainman was injured.

23d, on Pennsylvania road, at New Boston Junction,

(Continued on page 220.)



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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.

At the last meeting of the New York Railroad Club the paper by Mr. Gibbs on electric transmission of power in shops, which we gave at considerable length in our last issue, was presented and discussed. The discussion was only moderately valuable, partly, we suppose, because so few people have had much experience with the use of electric motors in machine shops and partly because that experience has necessarily been brief. It is worth mentioning, however, that the main point of Mr. Gibbs' paper was almost ignored in the discussion, namely, that the question of fuel saving is of slight importance. It may be nothing, or it may be only a small percentage of about 2 per cent. of the total cost of running the shop and it quite disappears in the effect of the use of motors on the output. That after all is the main question—the increase of economy and efficiency of the men and machines. Generally speaking, the question of power absorbed in running line shafting or in conversion and transmission by electricity is of quite minor importance as compared with the question of saving labor by better disposition of the machinery.

We publish elsewhere a synopsis of the franchises which the New York Rapid Transit Commissioners now offer to the Manhattan Railway Company. It will be observed that seven distinct franchises are offered, and the company can accept any one of these, or all of them. Accepted as a whole, they would give a very important degree of relief in passenger capacity and in speed, and any one of several of them would give considerable relief. The Board has been moderate in its requirements; has placed the rental low, and has, so far as we can judge, in every way made it easy for the Manhattan Company to accept these franchises. Indeed, the consideration of the Board has been carried so far as to avoid specifying the use of a motive power other than steam. In fact, the proposition of the Board is ably designed to reveal the actual intentions of the Manhattan Company. The Board grants, in substance, everything that the company has asked for. It is not even stipulated that the capacity of the downtown lines or the downtown terminals should be increased as a condition of getting franchises for the occupation of new territory, for the Board believes that the company will find that its own interest is served by so increasing the capacity of its existing lines. Probably the most important single one of the franchises offered is the improvement of the Third Avenue system, consisting in providing a continuous fourth track from the City Hall to a point near Cooper Union, and a continuous third track north of that to the Harlem River, and improving the terminals and getting rid of grade crossings at Chatham Square. For this the Board exacts a rental of two per cent. on the increase in the gross receipts of the line, and it fixes a maximum time of two years for completing the construction from the City Hall to Fifth street, and one year for the third track work above that point.

The next franchise in public importance is to make a third track continuous from Rector street to 155th street, along the Ninth Avenue line, with provision for express stations which can be used by trains on this third track, thus avoiding any obstruction to the way tracks. Here again a rental is fixed at two per cent. of the increase in gross receipts, and the time limit is fixed at one year. On the position now taken the Board can safely rest, awaiting the decision of the company.

Some of the Troubles with Height of Drawbars.

A number of roads are having considerable difficulty in maintaining the height of drawbars of freight cars so as to come within the limits of the law providing that the maximum height shall be 34½ in. from the top of the rail to the center of the drawbar, and that the minimum height shall be 31½ in. Railroads that have gone to much trouble and expense to comply with the law are now being annoyed by notices from the Interstate Commerce Commission that cars have been found by its inspectors which do not come within the requirements for drawbar height.

An investigation of these cases has brought out some facts as to the causes for the variations in the height of cars. It has been found that where empty cars are raised to as near a height of 34½ in. as possible, the ends may be too high when the cars are loaded; this is due to the load depressing the sills at the middle and consequently raising the drawbars above the maximum height allowed. Putting new axles, wheels and brasses under cars which have previously been adjusted for height, may raise the car as much as ¾ in., which in some cases is sufficient to cause the car to be reported.

Probably the most serious difficulty which has yet arisen has been caused by variations in the measurements themselves resulting from irregularities in the track upon which the car may be standing when the measurements are taken. To get an accurate measurement, it is evident that the car should stand on well surfaced track and not be coupled up to other cars. These, however, are not the conditions under which it is practicable to make measurements, but the inspectors are obliged to do the greater part, if not all of their work while the cars are in the yards and in some instances where cars are coupled together.

Mr. G. W. Rhodes, of the Chicago, Burlington & Quincy, has had measurements taken of a car in different positions on an ordinary yard track, which show that the distance from the center of the drawbar to the top of the rail may vary as much as 1¼ in., and it is not unreasonable to suppose that the variation might be still greater were the cars measured when on sidings in very poor condition.

The conclusion seems to be that more care should be taken in measuring the height of cars, and it has been suggested that the average of the two end measurements, taken with the car on a yard track, would give results nearer the conditions of a car on main line than either of the single measurement alone. Where such a variation in the measurement of drawbars can be shown, it would be a difficult matter to enforce the penalty for not complying with the law, which amounts to one hundred dollars for each failure. The whole matter illustrates the ease of making laws and the difficulty of making them conform to the facts of life.

Where Our Breadstuffs Are Grown.

The idea of many people in the East, and of not a few in the West, concerning the territory where a surplus of breadstuffs is produced, are very inaccurate, partly due to a change in the kinds of crops cultivated in parts of the country.

For instance, Northern Illinois in its earlier years produced wheat chiefly, not being able to market any other crop, and down to the war it was a large producer of wheat. But not long after the war the north third of the State virtually ceased to produce wheat, and for something like thirty years it has for the most part imported its breadstuff. Yet the State, as a whole, continued to grow wheat and as late as 1879 or 1880 it was credited with a production of 60,000,000 bushels—more than any State had ever produced in any one year down to that time. Now it seems that last year the whole State failed to produce enough for its own bread—only 11,500,000 bushels, while the consumption of the population of 1890 is more than 17,000,000 yearly.

Wisconsin, which has until recently been counted as peculiarly a wheat State, though the cultivated area has never been very large, last summer pro-

duced barely enough for its own use. Iowa, which is one of the most purely agricultural States, though not a great wheat State, last year had perhaps 4,000,000 bushels more than it will need for bread and seed, and Missouri probably just about met its own requirements. The crop was exceptionally poor in Illinois, and smaller than usual in the other States named, except Iowa, where it was larger than in 1896.

But we have heard so much of the bountiful wheat crops of last summer, that it will seem almost incredible to many of us that the four States named, which include three of the greatest agricultural States in the Union, in the aggregate last year did not produce as much wheat as they consume; and this is to be borne in mind in estimating the traffic of the railroads in that part of the world.

In fact, the whole talk of a great crop has been due to large production in the three States, Minnesota, Nebraska and Kansas, which are credited with 145,000,000 bushels in 1897, against 77,000,000 in 1896, and especially to the higher prices, which have made the crop really remunerative, as some larger ones have not been. There was an increase in the crops of Oregon and Washington from 18,500,000 in 1896 to 38,000,000 last year; but the crops of those States have little effect in this part of the world.

It should be said that all comparisons with years previous to 1897 must be received with caution. For many years it has been evident that the statistics of the Agricultural Department were defective, and for wheat gave aggregates far below the actual production. The Department has recognized the defectiveness of the past figures and has made especial efforts to make those for 1897 more complete. We may assume, therefore, that the total of 530,000,000 bushels reported for last year is not so much greater than the actual production of the four previous years, as would appear from its reports for those years. We may also assume that where a decrease is reported for certain States last year, it is greater rather than less than appears in the statistics.

Another fact that appears from the report for 1897 is that the Dakotas had a light crop then, though Minnesota had next to its largest one. The Dakotas were credited with 90,000,000 bushels in 1895, 58,000,000 in 1897, and 50,000,000 last year.

And still further it should be remembered that even an agricultural State may be very prosperous with a very small wheat crop. Some agricultural States cannot be. North Dakota, for instance, produces scarcely any corn and at its best estate 19,000,000 bushels of oats; and a poor wheat crop, unless prices are high, means poor business; but Nebraska, with 241,000,000 of corn and 52,000,000 bushels of oats last year, could have lost half its 27,500,000 bushels of wheat and still been prosperous; and no great wheat State turns out nearly so much total value of agricultural produce as Illinois or Iowa.

February Accidents.

Our record of train accidents in February, given in this number, includes 76 collisions, 97 derailments and 2 other accidents, a total of 175 accidents, in which 27 persons were killed and 103 injured. The detailed list, printed on another page, contains accounts only of the more important of these accidents. All which caused no deaths or injuries to persons are omitted, except where the circumstances of the accident as reported make it of special interest.

These accidents are classified as follows:

COLLISIONS.	Rear.	Butting.	Crossing and other.	Total.
Trains breaking in two.....	12	0	0	12
Misplaced switch.....	1	0	2	3
Failure to give or observe signal.....	8	0	1	9
Mistake in giving or understanding orders.....	0	1	0	1
Miscellaneous.....	12	6	4	22
Unexplained.....	11	7	11	29
Total.....	44	14	18	76
DERAILMENTS.				
Broken rail.....	2	Track repairs.....		1
Loose or spread rail.....	4	Bad switching.....		1
Defective bridge.....	2	Runaway train.....		1
Defective switch.....	4	Animals on track.....		2
Defective frog.....	1	Landslide.....		2
Broken wheel.....	5	Snow or ice.....		2
Broken axle.....	13	Washout.....		1
Broken truck.....	2	Accidental obstruction.....		2
Fallen brakebeam.....	1	Unexplained.....		47
Broken car.....	2			
Misplaced switch.....	2			9

OTHER ACCIDENTS.

Breakage of rolling stock.....	1
Other causes.....	1
Total.....	2

Total number of accidents..... 175

A general classification shows:

Collisions.	Derailments.	Other accidents.	Total.	P. c.
Defects of road.....	0	0	13	7
Defects of equipment.....	12	23	1	36
Negligence in operating.....	35	5	0	40
Unforeseen obstructions.....	0	9	1	10
Unexplained.....	29	47	0	76
Total.....	76	97	2	175

The number of trains involved is as follows:

	Colli- sions.	Derail- ments.	Other accid's.	Total.
Passenger.....	25	25	0	50
Freight and other.....	108	73	2	183
Total.....	133	98	2	233

The casualties may be divided as follows:

	Colli- sions.	Derail- ments.	Other accid's.	Total.
Killed:				
Employees.....	15	6	1	22
Passengers.....	0	1	0	1
Others.....	2	2	0	4
Total.....	17	9	1	27

	Colli- sions.	Derail- ments.	Other accid's.	Total.
Injured:				
Employees.....	36	21	1	58
Passengers.....	31	14	0	45
Others.....	0	0	0	0
Total.....	66	35	1	102

The casualties to passengers and employees, when divided according to classes of causes, appear as follows:

	Pass. Killed.	Pass. Injured.	Emp. Killed.	Emp. Injured.
Defects of road.....	1	5	0	0
Defects of equipment.....	0	5	1	2
Negligence in operating.....	0	31	15	36
Unforeseen obstructions and maliciousness.....	0	2	3	8
Unexplained.....	0	2	3	12
Total.....	1	45	22	58

Eighteen accidents caused the death of one or more persons each, and 28 caused injury but not death, leaving 129 (74 per cent. of the whole) which caused no personal injury deemed worthy of record.

The comparison with February of the previous five years shows:

	1898.	1897.	1896.	1895.	1894.	1893.
Collisions.....	76	44	34	43	37	84
Derailments.....	97	71	91	92	65	117
Other accidents.....	2	2	1	3	3	13
Total accidents.....	175	117	126	138	105	214
Employees killed.....	22	21	35	13	14	45
Others killed.....	5	3	2	5	1	14
Employees injured.....	58	40	54	75	45	127
Others injured.....	45	41	53	44	13	176
Passenger trains involved	53	38	51	72	38	83

Average per day:

	1898.	1897.	1896.	1895.	1894.	1893.
Accidents.....	6.25	4.17	4.45	5.11	3.75	7.64
Killed.....	0.96	0.86	1.28	0.84	0.54	2.11
Injured.....	3.68	2.89	3.69	4.25	2.67	10.82

Average per accident:

	1898.	1897.	1896.	1895.	1894.	1893.
Killed.....	0.15	0.20	0.29	0.12	0.14	0.27
Injured.....	0.59	0.69	0.83	0.83	0.55	1.41

We have reports in February of only one accident which caused the death of a passenger, that at Waycross, Ga. The accounts indicate that in this case the passenger, an elderly woman, died from nervous shock. While the number of persons killed in train accidents in February was not large, as compared with former records, there were a dozen or more notable accidents, the more prominent cases (besides that at Waycross) being the following: New Milford, Ill. (19th); Fredericksburg, Ia. (1st); Hematite, Mo. (5th); Winter Hill and Marlboro, Mass. (3d); Porter's Mass. (4th); Wyoming and Quincy, Mass. (16th), and Kirkland, Ala. (10th). All of the five Massachusetts collisions were occasioned by unusually severe snowstorms, though it does not appear that the snow was to blame for any of them. Of the nine we have named, at least six are collisions which happened under circumstances illustrating the value of the space interval plan of running trains. In at least three of these six cases the road was equipped with automatic signals, but the fault was with the men and not in the signals.

We have now had three consecutive monthly records of accidents, each showing a large increase over the same period of the preceding year, and indeed, generally speaking, over any like period for three or four years. In other words, with the large increase in train movement we have had to record a large increase in accidents. But the casualties to persons have not increased in the same proportion as the number of accidents. In the following table we have gathered the totals of the most salient items for the three months of the winter just closed and have compared them with the three winter months of one year ago. It will be seen that in the number of employees killed—which besides being, usually, the most serious item in the account, is the one which generally shows the least fluctuation—there has been a decrease rather than an increase; and the average number of persons of all classes killed in train accidents, per day, has not increased in anything like the same proportion that the number of train accidents has increased.

COMPARISON OF TWO WINTERS.

	1897-98.		1896-97.	
	Acci- dents.	Killed.	Acci- dents.	Killed.
Passengers, three months.....	9	9	21	21
Employees " ".....	79	79	90	90
Total.....	640	103	338	119
Total average per day, Dec.....	6.71	0.90	3.06	2.00
" " " Jan.....	8.29	1.55	4.06	1.06
" " " Feb.....	6.25	0.96	4.17	0.86
Total average per accid't Dec.....	0.13	0.13	0.65	0.65
" " " Jan.....	0.18	0.18	0.26	0.26
" " " Feb.....	0.15	0.15	0.20	0.20

The number of passengers killed would have shown a considerable increase this winter over last, but for a single disaster, that at the Cahaba River bridge in Alabama, in December, 1896, where 17 passengers and 4 trainmen were killed.

We find in February eight street car accidents, in which one person was killed and 16 were injured. Three of these accidents were collisions between electric cars and steam railroad trains. The one

fatal case, which was in Chicago on the 23d, was occasioned by the breakage of a coupling in a freight train. The accident occurred in the evening and both the gateman and the conductor of the street car thought the crossing was clear, but a string of cars which had broken away from the rear of a freight train came on and ran into the car while it was crossing the track. At Blue Island, Ill., on the evening of February 26, a passenger train of the Grand Trunk road ran into an omnibus and killed six of its occupants.

Annual Reports.

TEXAS & PACIFIC.—The report for the year ending Dec. 31, 1897, gives the first information which the public has had of the course of net earnings during the year. These exceeded the best previous total, as did also the gross earnings. The gain in the latter over 1896 was \$763,504, or 11 per cent., while in net the gain was \$502,973, or 30 per cent., due to reduction in the operating ratio (not including taxes), from 75.5 per cent. in 1896 to 71.3 per cent. in 1897. These results were obtained in spite of local causes tending to reduce earnings and increase expenses. In the early part of the year the levees on the Mississippi were threatened by the spring floods, and though no serious damage resulted, expense was incurred. Later in the year the yellow fever quarantine interfered with traffic and compelled the company to keep idle a portion of its equipment which otherwise would have been employed. In spite of these facts the earnings increased, not only over 1896, which was a poor year, but over every other year. Comparing gross earnings in 1897 with the best previous record—that of 1894—the gain figures out as \$235,637 and the 1897 net earnings, excluding taxes, are \$111,900 above the total of that year. The highest net earnings, however, were made in 1893, and the gain above that total is \$63,100. The result of 1897 was that the company earned a surplus above operating expenses of about \$706,000. The surplus, as reported, is \$447,969, various deductions from the net income, including \$248,000 for new equipment, bringing the figure down. The comparative income account for 1897 and 1896 follows:

	1897.	1896.	Inc.
Gross earnings.....	\$7,588,648	\$6,825,145	\$763,503
Operating expenses & taxes.....	5,622,748	5,367,586	255,162
Net earnings.....	\$1,965,900	\$1,457,559	\$508,341
Other income.....	150,297	109,533	40,764
Total income.....	2,116,197	1,567,092	549,105
Fixed charges.....	1,410,325	1,360,816	49,509
Balance.....	\$705,872	\$206,276	\$499,596
New equipment and other deductions.....	257,893	212,287	45,606
Surplus.....	\$447,979 (def)	\$6,011	\$453,990

The gains in revenue in 1897 were made entirely in freight receipts, and the largest part of the better showing there is due to the gains in through traffic. In passenger revenues there was an important decrease, which may be explained as due to the yellow fever, but it is also to be noticed that the passenger business has been poor since 1893. The 1897 receipts are \$355,000 below the total of that year. The loss in passenger receipts, as compared with 1896, is \$69,000, the freight revenues increasing \$848,000, made up of \$511,000 gain in through freight and \$337,000 gain in local freight. The details of the earnings for the last five years are given in the following table, 000's being omitted:

	1897.	1896.	1895.	1894.	1893.
Local freight.....	\$2,349	\$2,012	\$2,267	\$2,156	\$2,203
Through ".....	3,336	2,825	2,647	3,039	2,836
Total ".....	5,685	4,847	4,915	5,195	5,039
Passenger.....	1,464	1,533	1,660	1,702	1,819
Total, gross.....	\$7,589	\$6,825	\$7,015	\$7,353	\$7,334

The expense account is noticeable for the savings in cost of handling traffic, in spite of the heavier traffic. At the same time, maintenance expenditures, equipment and track, have been liberal since 1892.

The company has spent between \$750 and \$900 per mile for maintenance in each of the last six years. The rail renewals have averaged 5,700 tons a year since 1892; cross-tie renewals, 604,000 a year; it has ballasted about 239 miles of track and built 64 miles of side track, and the cost of all this work has been included in working expenses. As a result of this work, much of it betterment work, the physical condition of the road has been improved and heavier motive power and equipment can now be used than formerly. The effect in increasing the trainload may be seen in the following table of average train loads since 1890:

	Tons.	1893.	Tons.
1897.....	165	1892.....	150
1896.....	153	1891.....	136
1895.....	158	1890.....	130
1894.....	153	1889.....	123

In the same time the average carload has grown from 9.4 tons to 11.4 tons, while the average number of loaded cars per train was 14.5 in 1897, against 13.2 in 1890. The better train loading has made it possible to report a gain of 32 per cent. in the total ton mileage since 1892, with an increase of but 8.7 per cent. in the freight train mileage, as will be seen by the figures of traffic carried and train mileage given below, 000's omitted:

	1897.	1896.	1892.
Tonnage.....	2,367	1,875	1,681
Local ton-miles.....	151,440	137,764	156,127
Through ton-miles.....	396,884	276,713	259,290
Total ton-miles.....	548,324	414,477	415,417
Freight train miles.....	3,320	2,710	3,054
Ton-mile rate (cents).....	1.04	1.17	1.14

The saving in train mileage has more than made up for the fall in rates, the company reporting a higher net ton revenue and net ten-mile receipts than in 1892. In the latter year the net revenue per ton was 47 cents and in 1897, 66.9 cents per ton, a showing which was possible by reducing the expenses per ton from \$2.64 to \$2.04. The expenses per ton mile being reduced in like manner, the net ton mile rate in 1897 was 2.9 mills, against 1.5 mills in 1892.

The Systematic Time Tables of the Old Colony System.

The "mathematical time tables" of the Old Colony system of the New York, New Haven & Hartford are now so thoroughly established throughout the intricate network of the company's lines in Eastern Massachusetts, that an examination of the passenger train folder compels one to wonder whether the Superintendent has not hypnotized the whole public and succeeded in making passengers ride at his convenience instead of theirs. The fundamental idea of a time table is to run trains when people are ready to go; and to believe that at 30 or 40 junctions people uniformly acquiesce in exact 60-minute or 30-minute intervals, all day, seems at first thought to require a considerable stretch of credulity. And yet these tables have now been in use a year or two and the public seems to be perfectly satisfied. The schedules of different divisions fit together with the astonishing accuracy of chemical units in a natural compound, and the people of that part of the country evidently accept them as an unalterable provision of a beneficent Providence, against which remonstrance would be not only useless, but sacrilegious.

These time tables were described in the Railroad Gazette of June 2 and December 18, 1896. In brief, all passenger trains, on divisions of light traffic as well as on heavy suburban lines, run at regular intervals throughout the day (on thin lines usually even hours). The trains from Sherborn for Mansfield, for instance, start at 6.37, 8.37, 12.37, 3.37 and 6.37. On a busier line there would be 15-minute intervals, morning and evening, and 30-minute in the middle of the day. The day is divided at 1 p. m., trains starting out before 1 being matched by others returning at the same interval after 1. Thus, referring to the schedule just mentioned, one would expect trains to arrive at Sherborn from Mansfield at 1.23 and 5.23, to match those leaving at 12.37 and 8.37; and on turning to the table we find them; though at 1.24 and 5.24, discrepancies of one minute which we are sure are a source of mortification to the superintendent. It cannot be that this irregularity will be tolerated long.

It is manifestly impossible to give a sufficient idea of these tables without reproducing them bodily, and we mention the scheme now chiefly that readers who are interested may send for copies. (E. G. Allen, General Superintendent, Boston.) It seems that putting trains on these systematic schedules has proved a marked convenience to the operating department of the road, as well as to the public, and has resulted in some saving of train mileage. The one o'clock division enables a trainmaster to carry his whole programme in his head, almost. Of the 44 pages in the last folder, representing 30 divisions and branches (750 miles), there is not a page that is not made out on the systematic plan, except that of the main line west of Providence, and even that has some of its trains brought under the rule. There are still numerous exceptions, of course, but they are so few that, as we have said, the regularity is astonishing.

All trains are scheduled at a speed of about 45 miles an hour, with a uniform allowance for starting and stopping. The running time between terminals for trains making the same stops does not vary, and, as a rule, trains over the same line make the same stops throughout the day. By the one-o'clock division the connections and meeting and passing points are made identical in both directions. The time at junction points and large stations has been cut down as short as possible, making a great saving in through time. Connections are close and the schedules on the several branches are combined in such a way that the time is practically the same as if through trains were run.

It is possible to travel from the northwestern corner of the system to the end of Cape Cod, a distance of 166 miles, on local trains, making 60 stops, changing cars three times, at a speed of 26.21 miles an hour, including all stops. This can be done once a day, but the trains used are part of a combination of trains that cover the entire system with similar connections, the greater part of which are made several times a day. The average speed, including stops of suburban trains, running 11 miles or less out of Boston, is about 21 miles an hour; of suburban trains to points from 18 to 25 miles from Boston, 24 miles an hour. The average speed for local trains with a run of more than 25 miles is 27 miles an hour, and the time between large cities averages over 35 miles an hour.

NEW PUBLICATIONS.

Lubricants, Oils and Greases. Information Regarding Their Composition, Uses and Manufacture. By I. I. Redwood; octavo, 54 pages with index. New York: Spon & Chamberlain, 1898.

Mr. Redwood's little volume describes the materials

used for lubrication, giving chemistry, physical properties, methods of manufacture, compounding, etc. It gives also some brief account of methods of examining and testing lubricants for adulteration and to determine their properties. There are tables of viscosity and specific gravity, of atomic weights, of origins, tests, etc., of oils and action of oils on metals.

TRADE CATALOGUES.

Highway Crossing Signals.—The American Signal Company of Baltimore, Md., has issued catalogue No. 3, describing its automatic highway crossing signal. This company's signals have now been in use about 10 years and the catalogue describes them in considerable detail. There are lettered drawings of the apparatus which, however, are not accompanied by full technical descriptions. The American Signal Company has two devices for starting bells a-ringing, one a "circuit controller" actuated by an electric current through a short section of the track, and the other a mercury-contact track instrument, a mechanical apparatus worked by longitudinal steel bars, placed adjacent to the rail, to be depressed by passing wheels. The combination of the two bars is such that this contact maker can be worked only by trains going in one direction and it is therefore specially adapted for single track. The company furnishes a battery which will work in the coldest weather, and for a movement of not more than 40 trains a day will run a year without renewal. The company offers to furnish testimonials and references, but refrains from publishing them "because so many fictitious and unauthorized testimonials are presented to the public."

Mining, Tunneling and Quarrying Machinery.—The Ingersoll-Sergeant Co. sends us a copy of catalogue No. 41, covering rock drills, quarry bars, gadders, stone channelling machines and air compressors. Numerous half-tone engravings give a good general idea of the machinery shown, and these are often supplemented by line drawings showing construction in detail. Accompanying the drawings are descriptive tables and detailed lists of numbered parts for convenience in ordering duplicates. There are also general directions for purchasers, and descriptions of the uses of the machines. The pamphlet is handsomely printed in two colors and is a remarkably good specimen of work of this sort. The main office of the company is in the Havemeyer Building, 26 Cortlandt St., New York City. Its agencies are scattered all over the world, including Australia, South Africa and Chili.

Belting.—The Boston Belting Company, 256 Devonshire street, Boston, Mass., has issued a little circular describing Forsyth's patent Gutta-Balata belting. Although a comparatively new thing in the United States, belting of a similar nature has been made for many years in European countries, and successfully and extensively used for the transmission of power. The advantages claimed are that it is seamless, is practically unaffected by oils or grease, requires no dressing and can be laced and spliced in the same manner as other belting.

Pawling & Harnischfeger, Milwaukee, Wis., have just issued a catalogue of 63 pages, 6x9 in., descriptive of the different styles of traveling cranes which this firm makes. There are numerous illustrations from photographs of cranes now in use showing details of construction which are further explained by concise descriptions. G. P. Nichols & Bro., Monadnock Building, Chicago, are the Western representatives.

Train Accidents in the United States in February.

(Continued from page 217.)

Pa., a freight train standing at the station was run into at the rear by a following freight, damaging the engine, caboose and several cars. The fireman was injured.

24th, on South Carolina & Georgia, near Charleston, S. C., a switching engine ran into the rear of a preceding freight train, ditching the engine and 3 cars. Three trainmen were injured.

27th, at 2 a. m., on Lake Shore & Michigan Southern, at Andover, O., a freight train ran into the rear of a preceding freight, wrecking the caboose and several cars, and badly damaging the engine. Fire was started by the stove in the caboose and a part of the wreck was burned up. The fireman and 1 brakeman were injured. The collision occurred on a side track; one of the trains had already cleared the main track and the other one approached too fast.

And 28 others on 27 roads, involving 8 passenger and 37 freight and other trains.

Butting.

2d, on New York, New Haven & Hartford, near Marlboro Junction, Mass., butting collision between a southbound snow plow and a northbound milk train, making a bad wreck. One engine lodged on top of the other. Four trainmen were injured.

10th, 2 a. m., on Louisville & Nashville, near Kirkland, Ala., butting collision of freight trains, wrecking both engines and 13 cars. One engine, 1 fireman and 2 tramps were killed and 1 engine, 1 fireman and 2 trainmen were injured. The northbound train ran past Kirkland, the appointed meeting place. There was smoke from burning woods and the engine claims that he did not know that he had passed the meeting point.

10th, on Gulf, Colorado & Santa Fe, near Brenham, Tex., a platform car loaded with lumber, of which

the brakes were out of order, got away from the brakeman while being switched, ran some distance out on the main track and collided with a freight train on the bridge over Yeuga Creek. Some of the timbers crushed the cab of the locomotive, and of the 3 men in the cab 2 were killed and the third fatally injured.

10th, 11 p. m., on Charleston & Savannah, near Johns' Island, S. C., butting collision between a passenger train and a freight, damaging both engines. The electrician of the passenger train was slightly injured.

17th, 10 p. m., on Chicago & Northwestern, at Hubbard, Ia., butting collision between two freight trains, each drawn by two engines. All four engines were wrecked and 1 engine and 1 fireman were killed.

18th, 11 p. m., on Santa Fe Pacific, near Kramer, Cal., butting collision between an eastbound passenger and a westbound mixed train, badly damaging both engines. Both engines were killed. The engine of the eastbound train was running backward, and it is said that the other train encroached upon the time of this one.

19th, on Chicago, Burlington & Quincy, near New Milford, Ill., butting collision between a regular passenger train of the Burlington road and an extra passenger train of the Chicago, Milwaukee & St. Paul, making a bad wreck. There was a blinding snowstorm at the time. One of the engines was killed and 6 trainmen and 10 passengers were injured. The Milwaukee engine was running backward and its tender was crushed by the Burlington engine. It is said that the Burlington train was one or two minutes ahead of time.

19th, on Chicago, Burlington & Quincy, near Hillsdale, Ill., butting collision of freight trains, one of which was drawn by two engines. All 3 engines and 8 cars were badly damaged. There was a blinding snowstorm at the time. The northbound train ran past a meeting point; the conductor attempted to stop the train as soon as he saw the engine's mistake, but in consequence of the snow he was unable to signal to the engine. A number of hand brakes were set, but by the time he reached the cars equipped with air brakes it was too late to prevent the collision.

23d, on Chicago & Calumet Terminal, near East Chicago, Ind., butting collision of freight trains. The conductor was killed.

And 5 others on 5 roads, involving 3 passenger and 7 freight and other trains.

Crossing and Miscellaneous.

1st, on Detroit & Mackinac, near Bay City, Mich., collision between a snow plow and a freight train, injuring 4 employees.

19th, 2 a. m., on Pittsburgh & Lake Erie, at Dickerson Run, Pa., a freight train collided with a switching engine, making a bad wreck. The switching engine was overturned and its engine was scalded to death.

19th, on Delaware, Susquehanna & Schuylkill, at Shepton, Pa., a coal mine engine, switching on the main track, was run into by a passenger train, making a bad wreck. The switching engine was overturned and 1 passenger car was ditched. One trainman was killed and one engine and 1 passenger were injured.

21st, at New Washington, O., a freight train of the Pennsylvania lines ran into a passenger train of the Northern Ohio at the crossing of the two roads, overturning 1 passenger car and injuring 7 passengers. It appears that the freight train had broken in two on a descending grade and that the engine approached the crossing at uncontrollable speed, hoping to avoid a collision between the two parts of his own train.

27th, at Omaha, Neb., collision of Union Pacific and Burlington switching freight trains, badly damaging 1 engine and 3 cars. One fireman was injured.

And 13 others on 11 roads, involving 1 passenger train and 24 freight and other trains.

DERAILMENTS.

Defects of Roadway.

6th, on Chicago, Burlington & Quincy, near Humes-ton, Ia., a passenger train was derailed by a broken rail and the passenger car was overturned. One passenger was injured.

25th, on Savannah, Florida & Western, near Waycross, Ga., a passenger train was derailed on a trestle and the 3 rear cars fell through to the ground, about 5 ft. below. One passenger was killed and 4 were injured. The woods surrounding the trestle were burning and the structure took fire. A watchman was on duty, but in consequence of the dense smoke he failed to stop the approaching train. It appears that the bridge had not been burned sufficiently to weaken it, but that the rails had been forced out of line by the expansion due to the heat. The engine and forward part of the train crossed the bridge in safety.

And 11 others on 11 roads, involving 3 passenger and 8 freight and other trains.

Defects of Equipment.

1st, on Southern Pacific, near Volga, Tex., a passenger train was derailed by a broken wheel and 3 cars were ditched. Five passengers were injured.

2d, on Cumberland Valley, at Williamsport, Md., a freight train was derailed by a broken axle and 2 cars were wrecked. One brakeman was injured.

22d, on Philadelphia & Reading, at Leesport, Pa., a freight train was derailed by a broken axle and 12 cars were ditched. A brakeman was injured.

And 20 others on 19 roads, involving 2 passenger and 19 freight and other trains.

Negligence in Operating.

9th, on Wabash road, near Delphi, Ind., a long freight train, drawn by two engines, was derailed at a point where a rail had been taken out for repairs and both engines and several cars ran some distance on a high bridge while off the rails. A flagman had been sent out but the train appears to have been running at uncontrollable speed.

And 4 others on 4 roads, involving 4 freight trains.

Unforeseen Obstructions.

5th, on St. Louis, Iron Mountain & Southern, at Hematite, Mo., a passenger train running at full speed was derailed by running over a cow, and the engine and fireman were killed. Two passengers and 3 trainmen were injured.

6th, 2 a. m., on Northern Pacific, near Lake, Wash., passenger train No. 2 was derailed at a washout and the engine and several cars were ditched. Two tramps were killed and 2 trainmen were injured.

9th, on Wheeling & Lake Erie, at Mingo Junction, O., a passenger train ran into a small locomotive belonging to a furnace which was crossing the track.

Two men on the furnace engine were injured. The passenger engine was badly damaged.

15th, on Missouri, Kansas & Texas, near Paris, Mo., a freight train of the Wabash road was derailed by running over a horse, and the engine and 3 loaded cars fell down a bank. The conductor, riding in the engine, was killed, and 2 other trainmen were injured.

And 5 others on 5 roads, involving 2 passenger and 3 freight trains.

Unexplained.

1st, on Cincinnati, New Orleans & Texas Pacific, near Nicholasville, Ky., a freight train was derailed and 2 engines and several cars fell down a bank. Both engines were injured.

1st, on Southern Pacific, at Lang, Cal., a passenger train of the Santa Fe road was derailed and the engine fell down a bank. The fireman was injured.

4th, on South Haven & Eastern, at Lawrence, Mich., a passenger train drawn by 2 locomotives and pushing a snow plow was derailed and both engines were badly damaged. Two passengers and 3 employees were injured.

10th, on Kansas City, Memphis & Birmingham, near Birmingham, Ala., a freight train was derailed and the engine fell down a bank. Four trainmen were injured.

20th, 1 a. m., on Cleveland, Cincinnati, Chicago & St. Louis, at Greenwich, O., the engine and first two cars of passenger train No. 18 were derailed and ditched. An employee of the road, riding on the engine, was fatally injured.

21st, on Pennsylvania road, at Philadelphia, Pa., a freight train was derailed and the engine ran against a brick building and was overturned. The engine was killed.

22d, on Rome, Watertown & Ogdensburg, at Norwood, N. Y., a passenger train was derailed and 2 trainmen were injured.

27th, on Lehigh & New England, at North Bangor, Pa., the engine of a freight train was derailed and fell down a bank, and the engine was killed.

And 39 others on 38 roads, involving 8 passenger and 31 freight and other trains.

OTHER ACCIDENTS.

11th, on Cleveland, Cincinnati, Chicago & St. Louis, near Crawfordsville, Ind., the second of two engines hauling a freight train broke away from its tender and the fireman fell through to the ground below and was killed.

16th, on Central of New Jersey, near High Bridge, N. J., the roof of a car in a freight train was blown off by a high wind and a brakeman standing upon it was injured.

A summary will be found in another column.

Reduction of Passenger Fares in North Carolina.

The Supreme Court of the United States has dismissed the case of J. W. Wilson against the State of North Carolina in relation of L. C. Caldwell, on the ground that the Court has no jurisdiction. The case involved the right of the Governor of North Carolina to remove members of the Railroad Commission from office under the State law of 1891, and this right was sustained by the decision. Judge Peckham, in deciding the case, said that as the office was exclusively a state office, the United States Court had to deal only with the question whether Mr. Wilson was deprived of any right guaranteed by the Federal Constitution. He had not been so deprived, and accordingly the Court was without jurisdiction.

This decision sustains the right to their offices of the present acting Board of Railroad Commissioners, who have ordered a reduction of passenger fares throughout the state of North Carolina; and it appears that the reduction is to go into effect on March 26. The Commissioners issued their order Feb. 24, making first-class fares 2½ cents a mile, instead of 3½ cents, and second-class fares 2 cents, instead of 2½ cents. They heard remonstrances from the railroads, and elaborate and convincing arguments were presented by the Southern, the Atlantic Coast Line and the Seaboard Air Line, but it appears that the majority of the Commissioners were wholly unmoved by the facts set forth, and soon after announced their determination to let the order stand. Governor Russell, who began the present trouble, attacked the Southern Railway several months ago on the pretext that the company's lease of the North Carolina Railroad, three-fourths of which is owned by the state, was not fair to the state, and he tried to break the lease in the courts. This course, however, failed, and the Governor then tried to have the Railroad Commissioners reduce freight and passenger rates. Freight rates were reduced in many cases, but the Commissioners unanimously refused to disturb the passenger rates, which were already low for a thinly settled State. Thereupon the Governor trumped up some charges against two of the Commissioners and suspended them, appointing two Populists to fill their places. These two new appointees, whose tenure of office has now been confirmed, ordered the reduction in passenger fares, the third Commissioner voting against it. After this order was issued, however, the Governor made some kind of a compromise with the Southern (which included a lease by that road of the Atlantic & North Carolina, 102 miles long, Goldsboro to Morehead City), and he assured the railroads that fares should not be reduced; but meantime the Commissioners concluded to take the bits in their teeth, and they refused to accept the Governor's advice to rescind their order. It is said that the Governor first learned of their action by reading of it in the newspapers. He is now reported to be furiously mad, and the proposed lease agreement is, of course, "off."

TECHNICAL.

Manufacturing and Business.

The heavy business this year, showing an increase of something like 40 per cent. over the corresponding period in 1897, has made it imperative for the Sargent Company to increase their capacity, and to that end they have recently installed a 20-ton electric traveling crane from Manning, Maxwell & Moore, in addition to the cranes now operated, and an additional saw of the latest and most improved type made by the Q & C Company, and rearranging their receiving and shipping departments extensively. In the power house, new engines, dynamos, etc., are about to be installed. They now have a capacity of about 1,000 tons a month, which will be greatly increased by the changes now in process.

G. Whitefield Chance, 14 South Broad St., Philadelphia, announces the opening of an office for general engineering and contracting work with a specialty of railroads, steam and electric. He will also act as purchasing agent and inspector for rails, engines, electric apparatus and machinery and will arrange for tests. He is represented in the South by Mr. M. A. Agelasto, Consulting Electrical Engineer, 27 Plume St., Norfolk, Va.

The Epping Carpenter Co., manufacturers of steam pumps, has awarded the contract for its new plant to John Tonzer, 178 Thirty-eighth street, Pittsburgh. There will be four buildings of stone and brick, with steel frames. The Shiffler Bridge Co. will furnish the steel, about 250 tons.

The city of Lebanon, Pa., is about to ask bids for putting up 51 fire hydrants. J. D. Kerr is Clerk of the Water Board.

The Davis & Egan Machine Tool Co., Cincinnati, O., has recently received an order from the Gewerkschaft Deutscher Kaiser, at Druckhausen (Rhein Preussen), for 14 large machine tools. They have also received a large order for machine tools to be used by the Dutch Government.

The F. C. Austin Mfg. Co., Chicago, Ill., is in the market for a 72-in. boring mill and a 10-ton locomotive traveling crane.

Iron and Steel.

The Riter-Conley Co. has received the contract for the erection of an addition to the American Steel Casting Company's plant at Sharon, Pa.

The Potts Valley Iron Co. of Columbus, O., has been incorporated by R. W. McCoy, C. E. Ellis, R. K. Ramsey, J. W. Keegan and C. C. Morton, all of Columbus, with a capital stock of \$50,000.

It is reported that the Iowa Central will shortly place a large contract for rails.

Contracts were awarded for projectiles by the Government as follows: Carpenter Steel Co., 150 8-in. armor-piercing shot, 300 10-in. armor-piercing shot, 150 10-in. armor-piercing shell, 250 12-in. deck-piercing shell of 800 lbs. each, and 228 12-in. deck-piercing shell of 1,000 lbs. each; Sterling Steel Co., 100 8-in. armor-piercing shell, 150 10-in. armor-piercing shot, 250 10-in. armor-piercing shell, 250 12-in. deck-piercing shell of 800 lbs. each, and 205 12-in. deck-piercing shell of 1,000 lbs. each; Midvale Steel Co., 680 12-in. deck-piercing shell of 800 lbs. each and 344 12-in. deck-piercing shell of 1,000 lbs. each.

New Stations and Shops.

The Chicago, Burlington & Quincy is building a new spring shop at Aurora, to be 36 ft. x 70 ft., at which will be made and repaired all the locomotive springs for the road.

Bids were opened March 19 for the new shops of the Chicago Great Western Ry. These shops are to be built at Oelwein, Iowa, and will be quite extensive, covering about 180,000 sq. ft., and will be built of brick and steel. Contracts for plumbing, heating, electric power and water-works will be let separate from the contracts for the buildings. The work is under the direction of H. Fernstrom, Chief Engineer of the road, St. Paul, Minn.

We are officially informed that the different lines entering Fort Worth, Tex., have agreed to build a new union station at that point. At a meeting of the committee having the matter in charge, which is composed of officers of the roads interested, Mr. Phelps and Mr. B. S. Wathen, Chief Engineer of the Texas & Pacific, were appointed Consulting Engineers, to appoint superintendents of construction. Mr. Phelps and Mr. Wathen are also to employ a firm of architects to elaborate the plans already accepted, to draw up specifications, etc. A building committee of three, consisting of Messrs. S. B. Hovey, Vice-President and General Superintendent Chicago, Rock Island & Texas Ry.; L. S. Thorne, Third Vice-President and General Manager Texas & Pacific Ry., and L. J. Polk, General Manager Gulf, Colorado & Santa Fe, was appointed to agree upon plans and invite bids for the construction of the work. The dimensions and approximate cost of the new station will not be announced until this committee reports.

M. C. B. Rules of Interchange.

The Arbitration Committee requests that members of the Association who have suggestions to make for the revision of the Rules of Interchange at the June

Convention should communicate such to the Secretary on or before April 20, 1898.

Big Conduit Contract in Chicago.

Commissioner of Public Works L. E. McGann, of Chicago, advertised March 17 for bids for building two conduits, one at Lawrence avenue and one at Thirty-ninth street, for the new intercepting sewer system now under construction, and mentioned in our last issue. Bids will be opened and contracts let early in April. The estimated cost of the two conduits is \$1,500,000.

The New Chief of the Bureau of Yards and Docks.

Mr. Mordecai T. Endicott, Civil Engineer U. S. Navy, has been appointed Chief of the Bureau of Yards and Docks, the term being four years. This is a remarkable change in the custom of the Department, the chief of this very important bureau having for years been a line officer of the Navy and an officer of high rank. Since 1842 the Chief has been a Captain, a Commodore or a Rear Admiral, most of them having reached the grade of Rear Admiral while holding the office. It seems to an engineer a very obvious thing that this strictly engineering department should be under the command of an engineer of experience and high attainments, and we judge, therefore, that the change now made is in the direction of promoting the good of the service.

Mr. Endicott was born in 1844, was graduated as a civil engineer at the Rensselaer Polytechnic Institute in 1868 and for four years was in strictly civil practice. He then entered the service of the Government at the League Island Navy Yard, and has been in the Navy Department as Civil Engineer ever since.

It will be remembered that Mr. Endicott represented the Navy on the Nicaragua Canal Commission appointed by President Cleveland, that Commission having been made up of Colonel Ludlow, of the Army; Mr. Endicott, of the Navy, and Mr. Alfred Noble. The results of the very able work done by that Commission are too fresh in the minds of our readers to require notice now.

Pig Iron Production.

Mr. Jeans computes the production of pig iron in the United Kingdom for 1897 as 8,789,455 tons, as against 8,536,209 tons in 1896, an increase of 252,246 tons. The word compute is used as the Cleveland Ironmasters' Association has decided not to issue the statistics of their production, and that part of the British make has to be estimated from the known capacities of furnaces in blast. The receipt of Mr. Jeans' figures allows us to give the production of the three chief iron making countries for last year, to which is added the production of the same countries for 1896:

Countries—	1896.	1897.	Increase, per cent.
United States.....	6,488,738	9,652,680	48.7
United Kingdom.....	7,441,927	8,789,455	18.1
Germany.....	4,337,121	6,889,067	58.6
Total.....	18,267,786	25,331,202	38.65

1897 was a record year for all the three countries, and it is probable that the world's production will aggregate about 30,000,000, as against 23,575,000 tons ten years ago. In the meantime, judging from the blast furnace returns, we must be making a new record; they show that for December, January and February our production has probably been about 2,960,000 tons and that if there is no decrease in furnace capacity during this month the output for the four months will average fully 1,000,000 tons per month.

The Standard Railroad Signal Co.

Messrs. Burden, Renshaw & Co., of Troy, N. Y., controlling the Trojan Car Coupler Co., have acquired a controlling interest in the Standard Railroad Signal Co., of Arlington, N. J. A. H. Renshaw, H. Burden, 2d; P. C. Ricketts, H. Johnson and J. T. Cade now constitute the Board of Directors of this company. The officers are: A. H. Renshaw, President; H. Johnson, Vice-President and Treasurer; J. T. Cade, Secretary and General Manager. The executive officers of the Trojan Car Coupler Co. will unite their efforts to those of the signal company to make this business as great a success as has been made of the Trojan coupler. The infusion of a large amount of new capital will also enable the signal company to meet all competition.

The New York office of the Standard Railroad Signal Co. in the Havemeyer Building will be moved to that of the Trojan Car Coupler Co., at 49 Wall street, on or about April 1 next. The Chicago office of the former company will not be changed for the present.

The Standard Railroad Signal Co. has recently secured a large amount of new business, both in the East and in the West.

A Consolidated Wire Company.

According to newspaper reports, a meeting of the American Steel & Wire Subscribers was held at Chicago, March 18, when the attorney was instructed to apply for a charter, with capital stock of \$24,000,000, one-half to be cumulative 7 per cent. preferred and the remainder common. The seven plants to be bought are: Consolidated Steel & Wire Co., Chicago; Ellwood Mfg. Co. and Ellwood Wire & Nail Co., DeKalb, Ill.; American Wire Nail Co., Anderson, Ind.; Salem Wire Nail Co., Salem and Findlay, O.; H. P. Nail Co., Cleveland; American Wire Co.,

Cleveland. The officers are: Chairman, J. W. Gates, Chicago; President, John Lambert; Assistant Secretary for New York, F. E. Patterson. The general headquarters will be at Chicago. The plants mentioned will be bought and business will be started April 3. The new company will have a producing capacity of from 700,000 to 800,000 tons of wire and wire rods. The production is about 75 per cent. of the total production in the country. The following large companies are thought not to be in the arrangement: Washburn & Moen Manufacturing Co., Worcester, Mass.; Oliver Wire Co., Pittsburgh; Cleveland Rolling Mill Co., Cleveland; New Castle Wire Co., New Castle, Pa.

A Cold Storage Plant in Chicago.

The Western Cold Storage Co. has secured a lease from the Illinois Central of Pier No. 2, Chicago, and will at once begin the erection of a capacious system of cold storage houses. The location gives excellent rail and water facilities, and, being at the head of South Water St. is also accessible for teams. The first building will be 136 ft. x 206 ft., five stories, with basement and attic, with tracks on the south side. The building will be of mill construction and so designed as to be practically two buildings. The materials will be brick and tile veneer. The boilers and machinery will be located in a separate building 100 ft. x 100 ft., and the plant will be equipped with the most modern machinery and appliances, extensive use being made of electricity for the distribution of power. The cost of this plant will be about \$200,000 and it is understood that this will be only the beginning of more extensive improvements. Mr. Charles L. Krum, Mechanical Engineer of the company, designed the plant and will have charge of its construction, Mr. Jarvis Hunt being the architect.

Horseless Carriages for Chicago.

The Owen H. Fay Livery Co., Chicago, has ordered from the Fischer Equipment Co., also of Chicago, 50 cabs which will be operated by electric motors and storage batteries. These carriages are to be 9 ft. long, will weigh 2,600 lbs. in working order and have sufficient storage capacity for running about 40 miles under ordinary conditions without recharging. The maximum speed attainable will be about 12 miles and the average about 8 miles an hour.

Why Air Brakes Were Cut Out.

Last week we published a report of air brake cars cut out at Nashville on the Nashville, Chattanooga & St. Louis. The report for February follows:

During the month of February, 1898, there were 453 freight trains out of Nashville yard.

Average rating of freight trains, cars.....	19
Total number of air brake cars forwarded.....	2,285
Air brake cars O. K.	2,300
Air brake cars cut out.....	85
Average serviceable air brake cars to train.....	4.9

Of the air brake cars cut out there were:

Sand holes in triple valves.....	1
Release valves leaking.....	2
Release valves broken.....	1
Broken auxiliary reservoirs.....	1
Broken triple valves.....	2
Release springs gone.....	1
Cylinder gaskets broken.....	2
Triple valves blowing through pressure retaining valves or exhaust ports:	
Air brake company No. 5.....	5
Air brake company No. 1.....	11
Air brake company No. 6.....	1—Total.....
Quick action in service application:	
Air brake company No. 5.....	1
Air brake company No. 1.....	4—Total.....
Triples out of order:	
Air brake company No. 3.....	25
Air brake company No. 4.....	1—Total.....
Brakes would not apply:	
Air brake company No. 5.....	2
Air brake company No. 1.....	2—Total.....
Triple valves leaking out of vent in side of triples	
Air brake company No. 1.....	2
Brakes applied without any reduction—Air brake company No. 1.....	1
Cylinder leathers leak—Air brake company No. 1.....	1
Brake cylinder pistons broken.....	2
Branch pipes broken.....	5
Train pipes broken.....	3
Brake rigging out of order.....	6
Triple valves gone.....	2
Westinghouse triples on Landsberger reservoirs and would not fit.....	1
Total.....	85

Twenty-nine of this number were cars belonging to private car lines.

Patton Motor Car.

A motor car, the invention of Mr. W. H. Patton, built by the Patton Motor Company, Chicago, left Chicago Sunday morning, March 20, and will be run over the Chicago Great Western Railway under its own power to Cedar Falls, Ia., where it is to be used in street car service. The distance is about 279 miles, and the car will be exhibited at various points along the route. An inclosed car body, 16 ft. long, is mounted on a pair of wheels at either end and carries a 25-horse power, double-cylinder, gasoline engine, which is direct-connected to a shunt wound generator; a fly wheel is fixed to the engine shaft on the end opposite the generator. Geared to each axle is a 35-horse power motor, and in each end of the car are arranged storage battery cells. Gasoline and cooling water for the cylinders are stored in tanks near the roof of the car. When in operation the engine runs continuously so that the storage batteries are charged when the car is at rest, and in turn furnish current at starting or when ascend-

ing grades. The Patton car, which weighs about 26,000 lbs., is operated by means of a controller, the same as an ordinary electric motor car. A similar car has been in use at Cedar Falls since December, 1897, and has given satisfactory service.

The New East River Bridge.

The Commissioners of the New East River Bridge have addressed to the Mayor of New York a letter setting forth the fact that their work is blocked because they are out of money. The total indebtedness on April 1 will be about \$555,000, plus interest on \$350,000 from the 1st of last September. There is not money enough on hand to pay salaries to April 1. About \$4,140,000 will be wanted to carry the work up to July 1, including a new contract of about one million dollars to be given out at once on the steel towers and approach spans. The awarding of this contract was withdrawn Feb. 28 for want of money. A still further sum of not less than two million dollars will be needed to carry on the work for the year 1898. The Commission was requested by the Mayor to push the work with all possible speed. Accordingly, work on the four tower foundations has been carried on 24 hours in the day, the men working three shifts. The Commission hopes to complete the bridge by Jan. 1, 1901, in accordance with the wish of the Mayor, but, naturally, this cannot be done if there is much delay for want of money.

Chicago Drainage Canal.

The litigation arising through condemnation proceedings, which has delayed the work of the Sanitary District near Joliet, Ill., has now been settled. It is announced that the bids on the work near the lower end of the Drainage Canal route will be asked for within a few days, and that the work will be pushed as fast as possible. Delays have also been occasioned by disputes with the railroad companies crossing the canal as to the style of bridges which the District shall build, but these difficulties will be settled shortly. Mr. Isham Randolph, Chief Engineer, has estimated that the cost of the work of the District remaining to be done and not contracted will be approximately as follows:

Tail race, Lockport.....	\$90,000
From Tail race to Upper Basin.....	150,000
Construction and right of way through Joliet.....	1,700,000
Movable bridges for railroads and highways.....	1,153,724
Chicago River improvements.....	386,000
Total.....	\$3,539,724

THE SCRAP HEAP.

Notes.

A press dispatch of March 18 reports that there is to be a general increase in the pay of passenger conductors on the Lehigh Valley. Those now receiving \$2.75 a day will get \$3.25.

The Court of Appeals of New York, the highest court in the State, has confirmed a verdict of \$23,000 against the Brooklyn Heights (electric street) Railroad Co. in favor of a passenger who got off a car and, walking across the track behind it, was struck by a car going in the opposite direction.

The Legislature of Kentucky, which recently adjourned, passed a bill requiring railroad companies to carry bicycles free, the same as baggage, but the Governor has vetoed it. It is said that the majority for the bill was very large, and that if the Legislature had not adjourned it could be passed over the veto. The Governor holds that the bill is unconstitutional, and that the Legislature has no more right to pass such a law than to require the railroads to carry buggies as baggage.

The Railroad Commissioners of Massachusetts have authorized the construction of a street railroad track across the track of the New York, New Haven & Hartford at grade in Marlboro. The New Haven road protested. The permission given by the order is limited to a term of five years, and the street railroad company must properly protect the crossing. There must be no trees or other obstructions to the vision within 1,000 ft. of the crossing.

A bill has been introduced in the Legislature of New York empowering the Railroad Commissioners to order interlocking signals at crossings of steam railroads by electric lines, and another requiring railroad companies to pay interest on any deposits of money required of employees. The Lower House of the Ohio Legislature has passed a bill extending for two years the time for equipping freight cars with automatic couplers. It contains a proviso that half the work shall be done within the present year. The Iowa Legislature has extended the coupler law two years.

Electrical Materials for South Africa.

According to the Journal of Commerce, information from South Africa says that specifications and plans of an electric lighting and tramway scheme for East London are required. It is contemplated to build a plant capable of supplying current to meet the requirements of the town, both private and public, provision to be made for future extensions for furnishing the harbor and railroad departments with such current as they may require. The site of the generating station has been fixed so as to be near the wharf extension, and also the railroad line. The plant must be capable of supplying current to an equivalent of 2,804 C. P. incandescent and 43 arc lamps and for three miles of tramways. For street lighting 18 2,000 C. P. arc lamps and 300 32 C. P. incandescent lamps will be used. For the harbor department 21 2,000 C. P.

arc and 725 16 C. P. incandescent lamps; for the railroad department 4 2,000 C. P. arc and 27 C. P. incandescent lamps. For private lighting there will be considerable current furnished. It is proposed to adopt the overhead trolley system of traction, the track to have 60 lb. rails and cars built to carry 25 persons. Mr. R. Lewis Cousens has been appointed as adviser, and from all reports he will decide the different apparatus from plans submitted. Other opportunities for electrical work in South Africa are said to be an electric light plant for the Monastery Diamond Mine, Orange Free State. An electric tramway at the Sheba Gold Mine, instead of the present steam road, is also under consideration.

Opening of Lake Navigation.

The lake season opens early, and vessel owners say that rarely has the middle of March seen all the great lakes ready for boats. The 1,600,000 bu. of wheat owned by Joseph Leiter, and already on board 19 boats for shipment, has much to do with the haste of vessel owners in getting their boats out. The amount of grain afloat at Chicago now is 10,852,000 bu., consisting of 1,600,000 bu. of wheat, 6,840,000 bu. of corn, 2,200,000 bu. of oats, 198,000 bu. of rye and 93,000 bu. of barley. Grain in elevators consists of 9,883,000 bu. of wheat, 21,726,000 bu. of corn, 2,810,000 bu. of oats, 895,000 bu. of rye and 503,000 bu. of barley, or 34,817,000 bu. in all.

Miles E. Barry, of the Independent Towing Co., says: "The two harbors of this city—at Chicago and the Calumet—will see a greater activity this spring than ever before. Prospects for heavy cargoes are good, and I cannot see now why anybody should not be afloat with boats loaded by April 15 at the latest. River and lake interests have every reason to congratulate themselves on the prospect of paying business before them."

The Graham & Morton Co. will replace the City of Duluth, destroyed last winter, with a new boat as good or better. The Minnesota Steamship Co. has ordered a steel barge from the Chicago Shipbuilding Co. The new charter of the Canada Atlantic Transit Co. has created considerable interest in local marine circles. This company has taken the five steel steamers of the Menominee Transit Co.'s fleet and will operate three of these steamers between Chicago and Parry Sound, and two between Duluth and Parry Sound, in connection with the Canada & Atlantic Ry. The company has secured a piece of property north of the river in Chicago with 425 ft. dock frontage, upon which it is building a freight-house which will contain 50,000 ft. of floor space. It will operate the line into Milwaukee, having secured dock facilities there. The company has an elevator at Parry Sound with a capacity of 1,250,000 bu., and will erect a large warehouse. At Coteau Landing it will erect a transfer elevator of 500,000 bu. capacity; also, warehouses and docks. It is intended to transfer grain and package freight to Montreal and deliver alongside of ocean vessels in the harbor there. The company has also chartered the new steamer William R. Linn for her first cargo of grain. Freight rates are in only fair condition. The average rate on all ores moved from the head of Lake Superior last year was found to be about 64 cents. For this year the Carnegie Co. has contracts at 65 cents, but there are reports that a part of the 1898 business will be closed at 60 cents. The coal situation is uncertain, the rates offered being 30 cents to Lake Michigan and 25 cents to Lake Superior.—Condensed from Chicago Times-Herald.

Fire at the Pennsylvania Station, Jersey City.

On March 21, the Pennsylvania passenger station at Jersey City was damaged by fire to the extent of between \$75,000 and \$100,000. The fire, the cause of which, it is stated at the company's office at Jersey City, is unknown, started in the restaurant, which, together with the waiting room, was completely destroyed. The ferry slips are untouched, as is also, practically, the magnificent train shed, the only damage to it being that the glass in the end adjoining the waiting room was cracked by the heat and fell, somewhat hampering the firemen. The stock of tickets in the waiting room was burned, but no money was lost. The fire occurred at 2 a. m. and the train service was uninterrupted. A temporary passageway is now in use, by which the passengers go directly from ferry slips to the platforms. The waiting rooms will be rebuilt immediately.

Waterworks in Panama.

Under date of March 3, 1898, Consul-General Gudgeon writes from Panama: "The contract entered into by Messrs. Emile Lebon and Belisaire Marenovich to furnish water to the city of Panama has been forfeited, the contractors not having begun active work by the 1st of March, 1898. It is understood that the authorities will undertake to contract with other parties to furnish the much-needed water."

Chicago Public Works.

At a meeting of the Chicago City Council March 14 the annual budget was passed, appropriating \$16,193,498 for the expenditures of the city during the year, this amount being \$279,201 less than that appropriated for 1897. The following table shows the comparative amounts appropriated for the years 1897 and 1898 for the nine departments named:

	1897.	1898.
Building department.....	\$53,150	\$62,302
City Engineer's office.....	25,800	27,100
Repairs to bridges and viaducts....	100,000	85,000
Bureau of streets.....	270,000	916,788
Department of Public Works.....	1,455,548	1,439,649
Bureau of sewers.....	193,065	195,284
Bureau of water.....	247,924	291,169
Street lamp department.....	600,000	400,000
Department of electricity (new)....	259,255

As mentioned in our issue of Jan. 28, page 67, the Department of Public Works asked for \$10,509,440. Of this amount \$6,596,147 was for the intercepting sewer system, which it has now been decided can be paid for from the water fund; and \$1,720,193 was for new bridges and viaducts, for which no appropriation has been made. Deducting these two items from the total asked for leaves \$2,193,100, which is \$753,451 more than the amount actually appropriated for that department.

New Rail on the B. & O.

Thirty-one thousand tons of rail, ranging in weight from 75 to 85 lbs. to the yard will be put in the B. & O. tracks this spring. Work will begin by April 1 and be completed within three months. Twenty-one thousand tons will be laid east of the Ohio River. This forms part of the 49,000 tons purchased last summer, the balance being the 10,000 ton lot recently bought by the receivers for west of the Ohio River.

Lectures at Purdue.

On the 17th, Mr. A. M. Waitt, General Master Car Builder of the Lake Shore, lectured at Purdue University on Car Construction and Maintenance.

American Railroad Supplies for Argentine.

According to late reports, part of the La Capital Electric Railroad of Buenos Ayres, Argentine Republic, is running, with 41 cars. The greater part of the materials for building and equipping this system is American make; the rails are 9-in., 90-lb. grooved girder, made by the Johnson Co., bonded with Edison-Brown plastic bonds, Syracuse soldered; the entire rolling stock was built by the J. G. Brill Co., is mounted on Brill trucks and equipped with General Electric motors. The iron poles were furnished by Morris, Tasker & Co., and the overhead material by the H. W. Johns Mfg. Co. In the power-house three vertical Ball & Wood engines are coupled direct to Walker generators of 300 KW. each. Steam is supplied by four Stirling boilers of 250 H. P. each. The plant includes Green's fuel economizer, Conover's condenser and two Worthington pumps.

Exhibit of Mining Machinery at Coolgardie.

An exhibition of mining machinery is to be held at Coolgardie in the autumn of the present year. It is stated that the Government of Western Australia has arranged to carry exhibits free over its railroads.

LOCOMOTIVE BUILDING.

The Baldwin Locomotive Works are building one engine for the Sparta Iron Co.

The Mahoning Ore Co. is having one engine built by the Baldwin Locomotive Works.

The Southern Pacific will probably order five 10-wheel freight locomotives to replace lighter equipment.

The order for six freight locomotives for the Toledo & Ohio Central will not be settled until next week.

We are officially informed that the Iowa Central is not in the market for additional equipment at present.

The Erie Railroad is about to order a 6-wheel connected saddle tank locomotive, with 10 x 14 in. cylinders, for mine service.

The Indiana & Illinois Southern order for two 10-wheel freight engines has been placed with the Brooks Locomotive Works.

The Ann Arbor has bought one switching engine from the Pittsburgh Locomotive Works and may possibly consider buying two more engines this summer.

H. K. Porter & Co. has received an order to build one small locomotive for the Government. It is understood that it is for use at the Brooklyn Navy Yard.

We understand that the Lehigh Valley will shortly place an order for some new locomotives, and that the contract will be given to the Baldwin Locomotive Works.

The Chicago, Indianapolis & Louisville has given an order to the Brooks Locomotive Works for the five heavy freight engines referred to in our issue of March 11.

The Brooks Locomotive Works have received an order to build two heavy 6-wheel engines for the Union Railroad, a branch of the Pittsburgh, Bessemer & Lake Erie.

The Baldwin Locomotive Works are building one more engine for the Sorocabua & Itana Railroad. We referred to an order for three for this road in our issue of Feb. 25.

It is reported that the Cumberland Valley Railroad will buy two or three new passenger locomotives, but we were unable to confirm the item at time of going to press.

The Arizona & Southeastern has placed an order with the Dickinson Locomotive Works for one 10-wheel engine, with 20 x 26 in. cylinders and 60 in. drivers. It will be used for heavy mountain service.

The Canadian Locomotive & Engine Co. of Kingston, Ont., is building a small tank locomotive for British Columbia and one compound and two simple heavy 10-wheel engines for the Intercolonial railroad.

The Green Bay & Western has placed an order with the Dickinson Locomotive Works for two American type engines, with 17 x 24 in. cylinders and 60 in. driving wheels, practically duplicates of two built for the same road last year.

We are informed that the Illinois Central has not ordered 10 locomotives from the Brooks Locomotive Works as stated, but the motive power department has recommended to the President the buying of 30 or 40 locomotives. It is not yet decided whether the engines will be bought.

The exhibit of the Schenectady locomotive at the Trans-Mississippi Exposition, to be held in Omaha, will consist of one 10-wheel freight engine now building for the Northern Pacific and one passenger and one freight engine of the Chicago & Northwestern. The Baldwin Locomotive Works will be represented by a Vaclain compound built for the Chicago, Milwaukee & St. Paul, and one 10-wheel engine built for the Kansas City, Pittsburgh & Gulf.

In our last issue we referred to an order for 15 locomotives, given to the Baldwin Locomotive Works by the Egyptian Government Railways. These engines will be standard gauge, with 18 x 24 in. cylinders, 60½-in. driving wheels, 54-in. boilers, straight pattern, with 192 iron flues, 2 in. in diam. and 10 ft. 5¾ in. long; steel firebox, 71 in. long, 34 in. wide; weight, in working order, about 94,000 lbs. with 79,500 on the driving wheels. The tender will have three pairs of wheels, working in pedestals and will have a tank capacity of 2,000 Imperial gallons.

CAR BUILDING.

The Grand Trunk has started to build 300 more coal cars at its shops.

It is reported that the Pennsylvania will build 1,500 cars at its Altoona shops.

The St. Charles Car Co. is building one passenger car for the Kansas City, Fort Scott & Memphis.

It is stated that the Standard Oil Co. is receiving bids, through its Buffalo agency, on 100 box cars.

The Jackson & Sharp Co. is building two passenger cars for the Baltimore, Chesapeake & Atlantic.

The Elliott Car Co. of Gadsden, Ala., has received an order to build 200 box cars for the New Orleans & Northeastern.

The Missouri Car & Foundry Co. is building four more cars for Wells, Fargo & Co. We referred to an order for 50 for this same company in our issue of Feb. 11.

The Toledo & Ohio Central has placed an order for 400 cars with the Wells & French Co. and for 100 cars with the Michigan-Peninsular Car Co., details to be settled March 30.

The report published recently by a railroad paper that the Cleveland, Lorain & Wheeling was in the market for new cars is denied by the General Manager, who informs us that that road is not contemplating the purchase of equipment of any kind.

In reference to the report published by a contemporary to the effect that the Southern railroad is in the market for a large number of cars, we are officially informed that this is not true. The road may place orders for additional equipment in August or September, but nothing definite has been decided.

The St. Joseph & Grand Island has received bids and is about to close a contract for three 55-ft. passenger coaches. They will be equipped with Scarritt-Comstock seats, Kewanee brakebeams, Burrowes curtains, Adams & Westlake lamps, Janney-Miller platforms and Westinghouse air brakes and train signals.

The Lehigh Valley has placed an order with the Union Car Co. for 1,000 of its standard 60,000 lbs. capacity box cars. They will be equipped with Fox pressed steel trucks and bolsters, Tower couplers, Westinghouse air brakes, Winslow roofs, Dunham door hangers and fixtures, Graham draft rigging and Marden brakebeams. We understand an order for 1,000 more cars will be given in the near future.

The recent order for cars placed by the Erie Railroad with the Michigan-Peninsular Car Co. calls for 200 refrigerator, 1,000 box and 1,000 twin hopper coal cars. They will be built according to Erie standard specifications and equipped with Fox trucks and steel body bolsters, Graham draft gear and Kewanee brakebeams. The box cars will have Winslow roofs and Q & C doors.

The Wichita Railway, Light & Power Co. of Wichita, Kan., contemplates buying 12 closed and 15 open cars.

It is stated that the Troy & New England electric railroad of Troy, N. Y., is arranging to buy a number of new cars for summer traffic.

BRIDGE BUILDING.

BOSTON, MASS.—Ross & Fowler, 28 School street, were awarded the contract to build the masonry piers and abutments for the bridge across Fort Point Channel at Summer street extension. Their bid, it is stated, was \$79,840.

CHATTANOOGA, Tenn.—A county bridge, of iron, 112 ft. long, will be built across Chattanooga Creek on Mountain avenue.

CINCINNATI, O.—The State Senate has passed a bill authorizing the city to issue \$50,000 in bonds to repair the Liberty and Eight street viaducts.

CLEVELAND, O.—A bill is before the Legislature to authorize Cuyahoga County to issue \$150,000 in bonds for building a bridge at Brecksville. Such a bridge would be about 250 ft. long and extend over the railroad tracks, Cuyahoga River, and the Ohio Canal.

The Park Commissioners will build nine small steel bridges.

KANSAS CITY, KAN.—A bill was introduced in Congress authorizing the construction of a bridge across the Missouri River, at or near Quindaro, Kan., by the Kansas City, Northwestern & Gulf Railroad Company. J. J. Squire, Kansas City, Mo., is president of the company. The bill provides for a bridge of continuous spans, or a draw-bridge, not less than 50 ft. in height at high water mark. The bridge must be commenced within three and completed within five years.

LEBANON, PA.—The County Commissioners of Lebanon County have been directed to erect a new iron bridge over the Quitapahilla creek near Union Forge. The span is about 100 ft. James M. Snyder, Clerk.

LEAVENWORTH, KAN.—A bridge will be built across the creek at Sixth street at a cost of \$6,000.

MERIDEN, CONN.—Several small bridges will be required on the line of the Meriden, Southington & Compounce Electric Railroad. (See Electric Railroad Construction Column.)

NORRISTOWN, PA.—A bridge will probably be built across Saw Mill Run, from Arch to Greene streets, at a cost of about \$15,000. Edwin M. Ritchie, County Surveyor, can probably give some information.

PENSACOLA, FLA.—The bill to authorize the Pensacola, Alabama & Tennessee to build a bridge over the Alabama River in Wilcox County, Ala., has passed the Senate. (Feb. 25, p. 146.)

REDBLUFF, CAL.—The question of building a bridge across the Sacramento River at Jelley's Ferry is being considered by the Commissioners of Tehama County.

STEUBENVILLE, O.—The question of issuing \$150,000 in bonds for building a bridge over the Ohio River will be decided by vote, probably at a special election.

SYRACUSE, N. Y.—Mr. Bondy's bill, appropriating \$7,500 for a bridge over the Erie Canal at Catherine street has passed the Assembly.

TALLULAH, LA.—Press reports state that a steel bridge will be built across Bayou Vidal, Madison Parish.

TOPEKA, KAN.—Press reports state that two county bridges will be built across the Kansas River at Topeka, to cost about \$12,000 each.

WATERFORD, N. Y.—A bill has been reported in the Assembly calling for an appropriation of \$5,000 for a swing bridge over the Champlain canal at Burton's Mills, Waterford.

WHARTON, TEX.—A steel bridge will be built across the Colorado River at Rocky Crossing, eight miles above Wharton. J. G. Barbee, County Judge, Wharton County.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Chartiers.—Five per cent., payable April 1.

Norfolk & Southern.—Quarterly, 1 per cent., payable April 11.

Southern & Southwestern Railway Club.

At the April meeting, to be held at the Kimball House, Atlanta, on the 14th, the subjects will be: Revision of the M. C. B. Rules, Trains Parting, Exhaust Pipes and Modifications of Standard Journal Boxes for Use with Pedestals.

Chicago Electrical Association.

At a meeting of the Chicago Electrical Association, Friday evening, March 18, at Room 1737, Monadnock Block, Chicago, Mr. C. T. Gage, of the Washburn & Moen Manufacturing Company, read a paper, "The Autobiography of a Piece of Wire." Mr. C. H. Sewal presented a discussion of the paper.

Western Society of Engineers.

The Western Society of Engineers held a regular meeting Wednesday evening, March 16, in the Society rooms, Monadnock Block, Chicago. Two papers were read and discussed, the first, "Mechanical Plants of Large Buildings," by Mr. Dankmar Adler, and the second, "Improved Portland Cement," by Mr. John W. Dickinson. The next meeting will be held Saturday evening, March 26, at the Technical Club, when an illustrated lecture, entitled "Mexico," will be given by Mr. William J. Karner.

American Railway Association.

The spring meeting of this association will be held at the Galt House, Louisville, Ky., on Wednesday, April 6, at 11 a. m. Reports will be presented by the Executive Committee and the Committees on Train Rules, on Car Service, on Safety Appliances, on Interlocking and Block Signals, and on the Metric System. The annual election of officers will take place at this meeting.

Presidents, Vice-Presidents, General Managers, General Superintendents or other officials of the transportation or traffic departments connected with companies that are members of the association are invited to be present, and may order copies of the proceedings, which are furnished them at 50 cents per copy.

Engineers' Club of St. Louis.

The 469th meeting was held March 16, President Bryan in the chair. Twenty-seven members and eleven visitors were present. The paper of the evening by Mr. E. W. Sterne was read, entitled "The Steel Frame of the St. Louis Coliseum," and treating of the roof which has lately been built over the Coliseum building in St. Louis. The paper gave a general description of the arches, the loads for which the strains were figured, and the grade of steel used in the construction. The details of the various members and methods by which the expansion was taken care of were described. In the shop work, the arch was laid out full size on a laying-out floor. The author explained the methods by which the foundations and the hinge pins were accurately located. The paper was illustrated by numerous drawings and lantern slides. The discussion which followed was participated in by Messrs. Ramsey, Johnson, Hermann, Borden, Connor and Crosby.

Prof. Johnson presented by title a paper by Mr. Carl G. L. Barth, entitled "Investigation of Columns."

Mr. Crosby called attention to the fact that girders were being taken out of the Polytechnic Building which had been in service about twenty years, and stated that this was a good opportunity to observe the effect of rust upon this class of work.

Western Railway Club.

A meeting of the Western Railway Club was held Tuesday, March 15, at the Auditorium Hotel, Chicago. A letter from President James H. Smart, of Purdue University, was read inviting the Western Railway Club to hold its next meeting, April 19, at Purdue, that the members might inspect the University laboratories and the new shops of the Chicago, Indianapolis & Louisville Railway at La Fayette, Ind. It was voted to accept the invitation, and it is expected that special arrangements will be made with the Chicago, Indianapolis & Louisville for a train to and from La Fayette. The final arrangements for transportation will be announced later by the Secretary.

Mr. William Forsyth opened the discussion of the paper by Mr. Gustav Giroux, entitled "The M. C. B. Coupler." Mr. Forsyth outlined the various stages in the development of the M. C. B. coupler, and moved that the paper and discussion be referred to the M. C. B. Committee on Recommended Practice and Trains Parting, with the suggestion that the Association take up the question of coupler tests with a view determining what tests couplers should withstand, the number of blows, and the heights from which a specified weight should be dropped, together with the best arrangement of a drop test machine. This motion was carried.

Mr. E. N. Armstrong, General Superintendent of the Toledo, Peoria & Western, introduced for discussion the question of the advisability of equipping cars with air pipe and hose only, so as to avoid the switching necessary to get brake cars at the head of the train, when trains are made up of both air brake and non-air brake cars. The majority of the speakers did not approve of this practice, excepting where the cars were very old.

Printed copies of a letter from Mr. Pulaski Leeds, Chairman of the M. C. B. Committee on Loading Long Materials, were distributed at the meeting, which letter suggested certain changes in the instructions for loading long lumber, which will be brought up at the coming M. C. B. Convention. The proposed modifications of the rules were prepared

after a meeting of the representatives of twelve Southern railroads at Atlanta, Ga., where numerous complaints from shippers were carefully investigated.

The report of the committee, appointed at the January meeting, on the revision of the M. C. B. Rules of Interchange was discussed and the changes in the rules adopted by the Club will be forwarded to the Secretary of the M. C. B. Association.

It is expected that a paper will be presented at the next meeting by Prof. W. F. M. Goss, giving the results of certain experiments conducted at Purdue with model trains, which show the effects of air resistance.

PERSONAL.

—Mr. Charles L. Davidson, chairman of the Iowa State Board of Railroad Commissioners, died at his home in Hull, Sioux County, Ia., March 15, at the age of 52.

—Mr. William Hinton, of San Francisco, Cal., has been appointed a member of the California Railroad Commission, to fill the vacancy caused by the death of Dr. James I. Stanton.

—Mr. Charles O. Skeer, a Director of the Lehigh Valley, died at his home in Mauch Chunk, Pa., March 14, at the age of 80. He was also a Director of both the Linderman and Second National Banks of Mauch Chunk, Pa.

—Mr. Thomas McKean, President of the North Pennsylvania Railroad, which is a part of the Philadelphia & Reading, and a Director of the Philadelphia & Reading and the Lehigh Valley Railroads, died at his home in Philadelphia, March 16, at the age of 56.

—Mr. Albert A. Perkins, Treasurer and Superintendent of the Great Falls & Conway, now the Boston & Maine, from 1852 to 1872, died at his home in Somersworth, N. H., March 16 at the age of 51. Mr. Perkins was at the time of his death President of the Great Falls National Bank, and was Cashier of the Somersworth Savings Bank for 23 years.

—Mr. John C. Schriever, General Traffic Manager of the Atlantic system of the Southern Pacific, with office in New Orleans, La., died in New York City March 16, of Bright's disease, at the age of 64. Mr. Schriever entered railroad service in 1869 with Morgan's Louisiana & Texas Railway, which is now a part of the Southern Pacific. Seven years later he was appointed General Freight and Passenger Agent, and later became Vice President of the Louisiana & Texas Railway and Traffic Manager of the Atlantic system.

—Mr. Stephen Y. McNair, Secretary and Auditor of the Cleveland, Akron & Columbus Railroad, died at Cleveland last Saturday at the age of 62. Mr. McNair was well known as an accountant and an expert analyst of railroad accounts, in which special work he had spent many years. He entered railroad service 33 years ago, and from 1873 to 1889 he was Secretary and Chief Clerk to the Comptroller of the Erie. For two years he was Auditor and Treasurer of the Interstate Commerce Railway Association at Chicago. He served then for a short time as Assistant Auditor on the East Tennessee, Virginia & Georgia and for a year and a half had an office in New York as an expert accountant. Since June, 1894, he had been in the service in which he died.

—Mr. William F. White, for more than 20 years Passenger Traffic Manager of the Atchison, Topeka & Santa Fe, died at his home in Highland Park, Chicago, Ill., March 16, at the age of 52. Mr. White began his railroad career with the United Railroads of New Jersey, now a part of the Pennsylvania. For a few years previous to 1878, when the Atchison, Topeka & Santa Fe was known as the Kansas & Nebraska, he was its General Ticket Agent. On March 15, 1878, he was appointed General Passenger and Ticket Agent and remained as such until 1887, when he became General Traffic Manager. In October, 1889, he became Passenger Traffic Manager with office in Topeka, Kan., and later removed to Chicago. He was chairman of the Executive Committee of the Western Passenger Association. Mr. White's long and intimate acquaintance with trans-continental traffic rendered him an accepted authority in the traffic department, and his retention by the successive managements of the Atchison for so long a term of years evidences the high appreciation of his ability entertained by the various presidents and directors.

—Mr. Allyn Cox, Secretary and Treasurer of the New York, Chicago & St. Louis, and Assistant Secretary of the Canada Southern (Michigan Central), died at his office in New York City, March 18. Mr. Cox was born in New York City, Nov. 11, 1835. He commenced in railroad business in 1870, when he became Private Secretary to the Managing Director of the Atlantic & Pacific Railroad. From 1872 to 1874 he was Secretary to the President of the Canada Southern; Auditor of the Toledo, Wabash & Western, now the Wabash, from 1874 to 1880, and from 1880 to 1881 he was Treasurer of the Milwaukee, Lake Shore & Western, now the Chicago & Northwestern. From 1882 to 1883 he was Assistant Treasurer of the Canada Southern and was appointed Assistant Secretary in 1883, and remained as such until his death. Mr. Cox was also Treasurer of the Beech Creek, Clearfield & Southwestern, now the Beech Creek, in 1885, and became Secretary and Treasurer of that company in 1886; in 1891 he was made Secretary of the Beech Creek, which is leased to the New York Central & Hudson River. Mr. Cox was appointed Secretary and Treasurer of the New York, Chicago & St. Louis in 1886. In 1893 he was Secretary and Treasurer of the Carthage & Adirondack which is also leased to the New York Central & Hudson River.

—Hon. Wheelock G. Veazey, for eight years a member of the Interstate Commerce Commission, died in Washington, D. C., March 22, at the age of 63. Mr. Veazey was appointed from Vermont in 1888 to succeed Col. Aldace F. Walker, also from that State, and resigned in December, 1896, on account of failing health. Mr. Veazey was born in Brentwood, N. H., was educated at Dartmouth College, and, after studying law at the Albany Law School, was admitted to the Bar in Vermont in 1860. When the war broke out he enlisted as a private; was rapidly promoted, in 1862 was made a Colonel, and was mustered out as a Brigadier-General. He was for some time Chief of Staff to Gen. William F. Smith. He received a medal for distinguished gallantry at Gettysburg. He resumed his law practice in 1863,

and held various judicial positions in Vermont until 1879, when he was appointed Judge of the Supreme Court of the State, which place he held until he went to the Interstate Commerce Commission. He was prominent in the Grand Army of the Republic, and was for many years a trustee of Dartmouth College, which institution conferred upon him the degree of L.L.D. in 1886. Mr. Veazey was a man of strong character and conservative temperament, and was at one time Acting Chairman of the Commission.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—W. J. Black, General Passenger Agent at Topeka, Kan., is temporarily performing the duties of Passenger Traffic Manager until a successor is appointed to the late W. F. White.

Blue Ridge Dispatch.—Don Alexander, General Manager, has transferred his office from Harrisburg, Pa., to Louisville, Ky. The change is effective April 1.

Catonsville Short Line.—John S. Wilson of Baltimore, Md., President of the Baltimore, Chesapeake & Atlantic, has been made President of the Catonsville Short Line, which is a part of the Baltimore & Potomac, and controlled by the Pennsylvania.

Centralia & Chester.—E. A. Burrill, General Freight and Passenger Agent, with office at Sparta, Ill., whose resignation was noted in this column for March 4, has decided to remain in his old position.

Central of New Jersey.—George W. Twinning, Superintendent of the Lehigh & Susquehanna Division at Mauch Chunk, Pa., has been appointed General Agent of the Allentown Terminal, in addition to his present duties, succeeding John Wesner, resigned. Appointment effective April 1.

Chicago, Burlington & Quincy.—George G. Yeomans, heretofore Assistant Purchasing Agent, with office at Chicago, Ill., has been appointed Purchasing Agent, succeeding George Hargreaves, whose resignation was noted in this column for last week. The appointment is effective April 1.

Chicago, Milwaukee & St. Paul.—Assistant General Freight Agent D. C. Jones, who was recently transferred from Milwaukee, Wis., to Chicago, Ill., has resigned to engage in other business.

Cincinnati Northern.—W. T. Backus, formerly with the Cincinnati, Jackson & Mackinaw, has been appointed Master of Transportation with headquarters at Van Wert, O.

Cleveland, Akron & Columbus.—At the annual meeting held in Cleveland, O., March 15, Col. A. L. Conger of Akron, O., and C. N. Haskel of Ottawa, O., resigned as directors, and Frank Rockefeller and William Christolm were elected as their successors.

Columbia Southern.—The following officers were elected at the annual meeting held at Portland, Ore., March 7: E. E. Lytle, President and Auditor; M. Enright, Secretary; V. C. Brock, Treasurer, all at Wasco, Ore.

Des Moines Northern & Western.—R. M. Calkins, Division Freight and Passenger Agent of the Chicago, Milwaukee & St. Paul, at Mason City, Ia., has been appointed General Freight and Passenger Agent of the Des Moines Northern & Western, succeeding J. E. Tittmore, resigned.

Grand Trunk.—Frederick J. Thomas, Paymaster of the Western Division for the past 25 years, has resigned. George W. Alexander has been appointed Paymaster of the entire system, with office in Montreal, Que.

Hardwick & Woodbury.—The date for the annual meeting of stockholders has been changed to the second Tuesday in August. The present officers will hold their respective positions until the next annual meeting, in August.

Hartwell.—The officers of this reorganized company are as follows: President, A. B. Andrews; Secretary, H. W. Miller; Treasurer, H. C. Anslee; Auditor, A. H. Plant. The main office is at Raleigh, N. C. (March 18, p. 209.)

International & Great Northern.—H. B. Kane has resigned as General Claim Agent, and the office has been abolished.

Kansas City, Pittsburgh & Gulf.—F. H. Keeshen, heretofore Trainmaster of the Northern Division, has been appointed Division Superintendent of that division, succeeding W. A. Williams, promoted.

Lehigh Valley.—Alonso P. Blakeslee, for several years Superintendent of the Mahanoy & Hazleton Division with office at Delano, Pa., has resigned. The resignation takes effect April 1.

Little Kanawha.—I. K. Dye, who recently resigned as Commercial Agent of the Ohio River Railroad at Chattanooga, Tenn., has been appointed General Freight and Passenger Agent of the Little Kanawha, with headquarters at Parkersburg, W. Va.

Omaha, Kansas City & Eastern.—John M. Savin, Assistant General Manager and Acting Superintendent, has resigned.

Plant System.—J. G. Justice, formerly General Foreman at Waycross, Ga., has been appointed Master Mechanic at Savannah, Ga., succeeding D. B. Overton, resigned. S. M. Roberts has been appointed General Foreman at Waycross as successor to Mr. Justice.

Raleigh & Cape Fear.—At a recent meeting of the directors of this line, referred to in the construction column, G. B. Alford of Holly Springs, N. C., was elected President.

Rockport, Langdon & Northern.—At the annual meeting held March 8 at Rockport, Mo., John P. Lewis, a director, was elected President, succeeding John Lockwood. His office is at Rockport.

Santa Fe Pacific.—George W. Smith, heretofore Master Mechanic of the Eastern Division of the Atchison, Topeka, & Santa Fe, with headquarters in Topeka, Kan., has been appointed Superintendent of Machinery of the Santa Fe Pacific with headquarters at Albuquerque, N. M. The appointment took effect March 21.

Texas Central.—At the annual meeting held in Waco, Tex., in February, Charles Hamilton was elected Vice-President and General Manager, with office at Waco, and Richard Oliver was elected Secretary and Treasurer, not General Manager, Secretary and Treasurer, as reported in this column for Feb. 18.

Union Pacific.—T. A. Davies, Master Mechanic of the Wyoming Division, has removed his headquarters from Laramie, to Cheyenne, Wyo.

RAILROAD CONSTRUCTION. Incorporations, Surveys, Etc.

ABERDEEN & ASHEBORO.—Official statement is received that this company is making surveys for the proposed extension of the Troy Branch south 14 miles to Mt. Gilead, N. C. The company will do the grading and track-laying with its own forces. There are to be no bridges or tunnels and the rails and rolling stock are already purchased. J. R. Page of Aberdeen, N. C., is Superintendent. (March 11, p. 187.)

ALASKA ROADS.—At a recent meeting of capitalists in San Francisco, W. C. Alberger presented a report based on recent explorations, showing that a route for a railroad up Copper River is practicable. It was decided to organize a party of surveyors who will start about May 15. The proposed route is from Orca, at the mouth of the Copper River, north and east up that river to its head and thence east across to the Yukon at its junction with the American boundary line. The Alaska Central proposes a similar route. (Dec. 24, 1897, p. 917.)

The Alaska Railroad Co. was incorporated in New Jersey March 22, with a capital stock of \$1,000,000, to build a line from some point on the Lynn Canal in Alaska to Fort Selkirk. The incorporators are: Clinton W. Sweet, New York; Joel Francis Freeman, East Orange, N. J., and Henry W. Desmond, Cranford, N. J.

ALEXANDER GIBSON RAILWAY & MANUFACTURING COMPANY.—A bill to incorporate this company has come before the Provincial Legislature at St. John, N. B. The property of the company embraces the timber limits of 200,000 acres on the Nashwaka River, in the town of Marysville, cotton and lumber mills and the Canada Eastern Railroad, which extends from Chatham and Logieville to Gibson, opposite Fredericton, N. B., 127 miles, with a branch of 9 miles from Blackville to Indian town. Alexander Gibson, of Marysville, N. B., is President and General Manager of the Canada Eastern.

ATCHISON, TOPEKA & SANTA FE.—Contracts have been let for double-tracking the main line of this road in Kansas from Emporia southwest to Florence. The section between Emporia and Sterry goes to Contractor Wilcox, of Emporia. The section between Sterry and Strong City will not be built at present. From Strong City to Evans the Strong City branch runs parallel with the main line and will be used as a part of the double track. Between Evans and Emporia the contractors are the Ware Construction Company, of St. Louis, Mo., and J. D. McDonald, of Pueblo, Col. Work was begun last week and it is expected that three months will be required for its completion.

BALTIMORE & OHIO.—The new work at Falls Cut, Pa., on the Pittsburgh Division, was connected March 14. The work included the removal of six curves, shortening the line about 600 feet and a new tunnel, 535 feet long, with provisions for double track. (Dec. 3, 1897, p. 859.)

This company will place 32,000 tons of rail ranging from 75 to 85 lbs. on its tracks this spring. The work is to begin about April 1 and to be completed within three months. Of this 21,000 tons will be laid east of the Ohio River. The new rails will be laid on divisions where the traffic is very heavy. It has been found that about 60 per cent. of the old rail is in good condition to be relaid where light rolling stock is used.

BRIDGTON & SACO RIVER.—Official statement is received that this road is to be extended from Bridgton, Me., north 5 miles to Harrison. Contracts will probably be let early in April. William F. Perry, Bridgton, Me., is President.

BRITISH COLUMBIA, SEATTLE & PACIFIC COAST.—This company is being organized to build a line from Portland, Ore., on the Oregon Railroad & Navigation Co.'s line, north to Seattle, 180 miles, and thence north to the international boundary line and to a connection with the Canadian Pacific. The road is designed to replace the Seattle & International recently purchased by the Northern Pacific, and will give the Canadian Pacific an outlet to Puget Sound. The entire length of the road is about 300 miles, and its estimated cost, including a steel bridge over the Columbia River at Vancouver, Wash., is \$5,000,000. Among those interested are: Henry J. Braker, Judge Austin B. Fletcher and J. A. Simmons, all of New York City. The company has filed application for franchise over certain streets in the city of Seattle.

BUFFALO, ROCHESTER & PITTSBURGH.—Contracts have been let to Bennett & Talbot of Greensburg, Pa., and M. H. Smith of Altoona, Pa., for the tunnel 2,300 ft. long on the new extension of the Allegheny & Western from Punxsutawney, Pa., west 98 miles from New Castle. (March 18, p. 208.)

BURLINGTON & MISSOURI RIVER.—A decision has been reached, according to report, to build 93 miles of road to complete the connection between Deadwood, S. D., southwest to Newcastle, Wyo. This line will reduce by about 110 miles the length of haul for coal and coke from the mines near Newcastle to the smelters at Deadwood. (Oct. 29, 1897, p. 774.)

CHESAPEAKE BEACH.—A new survey is reported to have been made for the portion of this line in the vicinity of Marlborough, Md., which is being built from Washington, D. C., east about 30 miles to Chesapeake Beach. The old survey passed about one-half a mile to the southwest of the town, but under the new survey the line will pass directly through the center. (Jan. 14, p. 34.)

CHICAGO & SOUTHEASTERN.—Work has been begun, according to report, on the proposed extension of this line from Anderson, Ind., east 13 miles to Muncie. Most of the grading was completed three years ago. This road extends from Brazil, Ind., northeast

100 miles to Anderson. It was reorganized in 1891 as successor to the Midland. (July 23, 1897, p. 531.)

CHICAGO, ROCK ISLAND & PACIFIC.—The Chicago, Rock Island & Texas line of this road has filed an amended charter in Texas providing for its extension from Bridgeport west 28 miles to Jacksboro. John V. Hughes, the contractor for the first 10 miles, is reported to have begun work. (March 18, p. 208.)

CINCINNATI, GEORGETOWN & PORTSMOUTH.—The new route of this road under the final survey is officially stated to be from Georgetown, O., southeast 23 miles to West Union, passing through Russellville, Decatur and Eckmanville. At the West Union terminal it is estimated there are 12,000 acres of free stone of the finest quality, also a large amount of valuable timber. The maximum grades of this extension are 1 per cent., and the maximum curves 6 deg. There will be about 2,000 ft. of trestles. The company will need 2,300 tons of rails. Representatives are now locating right of way and receiving donations in money or material. It is stated that the line will probably be built if \$50,000 and the right of way are donated. E. W. White, of Cincinnati, O., is Vice-President and General Manager. (March 4, p. 169.)

DELAWARE, LACKAWANNA & WESTERN.—A spur, according to report, is to be run from the main line of this road at Little Falls, N. J., to the property of the East Jersey Water Company, for the purpose of delivering coal and other supplies.

DENVER & RIO GRANDE.—This company is reported to be considering the extension of its line from Santa Fe, N. M., into the interior of the state. The probable route would be south through Cerrillos and San Pedro Camps to White Oaks, to connect with the El Paso & Northeastern, now under construction.

GILA VALLEY, GLOBE & NORTHERN.—The Midland Construction Company is at work, according to report, at the Geronimo end of the extension of this line from Geronimo, Ariz., northwest 60 miles to Globe. The Indians through whose lands the road is to pass will be paid \$8,000 in their tribal capacity and somewhat less than \$2,000 will go to individuals. The company hopes to have track laid to Gila River by June 1. Ward & Courtney of El Paso, Tex., have been awarded the contract for building the line. (Feb. 25, p. 148.)

GUADALUPE VALLEY.—About 8 miles of grading has been completed, according to report, in the vicinity of Victoria, Tex., on this line, which is projected to extend from Galveston, Tex., west to Brownsville, 350 miles. Uriah Lott, of Victoria, is President and General Manager.

HAGERSTOWN & STATE LINE.—This company has been incorporated in Maryland to build the Western Maryland extension, known in West Virginia as the Washington & Franklin (Feb. 24, p. 89), from Hagerstown, Washington County, Md., to the state line; thence it will run to a point one mile west of Altenwald, Pa. The incorporators are: J. M. Hood, Baltimore; H. C. Koehler, William Kealhofer and H. Kyd Douglas, Hagerstown.

HUDSON BAY & PACIFIC.—A bill has been introduced into the Parliament at Ottawa, Ont., to amend the charter of this company so that its lines will extend from Fort Churchill, on the west shore of Hudson Bay, southwest to the grand rapids of the Saskatchewan River, near the northwest end of Lake Winnipeg; thence west through Prince Albert and Edmonton to the Yellow Head Pass. By the original charter the road was to be built from Prince Albert southward to Calgary.

HUTCHINSON & SOUTHERN.—Official statement is received that the extension has been completed from Medford, Okla., east 25 miles to Blackwell and the company commenced operating the same March 1.

ILLINOIS CENTRAL.—The city of Murphysboro, Ill., has given this company the privilege of extending its tracks, in that city, involving about \$175,000 of expenditure.

JAMES BAY.—The route of this road, as proposed to the Toronto Commission by Chief Engineer W. F. Jennings, is as follows: From Toronto north to a point on the Canadian Pacific between Sudbury and North Bay, thence northeast to Moose Factory on James Bay, an arm of Hudson Bay. The line then follows along the shore of Hudson Bay through Fort Albany and Fort Nelson to Churchill. (Jan. 21, p. 50.)

KEOKUK & WESTERN.—Surveyors are reported to be establishing the line for an extension of this road from Cainsville, Mo., southwest about 30 miles to Pattonsburg, where connection will be made with the new Kansas City & Northern connecting line of the Kansas City, Pittsburgh & Gulf.

LONG ISLAND.—Bills have been introduced into both Houses of the New York Legislature giving this company right in perpetuity instead of the 25-year franchise limit under the charter of the Greater New York for its tunnel under the East River. It is stated that the company can get no subscriptions to stock under a 25-year franchise, but that \$7,000,000 has been offered if the franchise can be made perpetual. The tunnel is to run under the East River south of Fulton Ferry and have its terminal at Cortlandt and Church streets. This is in connection with the improvements for depressing the track in Atlantic avenue, Brooklyn, under the law passed a year ago. (April 3, 1897, p. 299; and Nov. 5, 1897, p. 791.)

LOS ANGELES TERMINAL.—Official statement is received that this company proposes extending its line from Los Angeles, Cal., east about 40 miles to Pomona and beyond. This portion of the line will be steam, but the company will adopt electricity on its Pasadena and Glendale lines in the near future. The road extends from East San Pedro to Altadena, Cal., 43.1 miles, and from Glendale Junction to Verdugo Park, 7.1 miles.

MANSFIELD SHORT LINE.—The Crouch Construction Company, of Chicago, according to report, has been awarded the contract for building this line from Shelby, O., southwest via Mansfield to Lucas, about 20 miles. Work is to begin within thirty days and the road completed within six months. (Nov. 20, p. 841.)

MEXICAN INTERNATIONAL.—The statement made in this column March 11 that active work

will begin April 1 on the proposed extension from Durango west 150 miles to Port Mazatlan on the Pacific Coast is officially declared to be premature. The company, however, is now pushing to rapid completion a branch line southeast 72 miles to the city of Monterey. Grading has been completed, bridge masonry is well under way, and rails, ties and spans for the bridges have been contracted for and are being delivered with the expectation of having the line open for business early the coming summer.

MEXICAN ROADS.—Arrangements have been made, according to report, for the immediate construction of the line from Oaxaca, Mex., the terminus of the Mexican Southern, southeast about 185 miles to Tehuantepec, where connection will be made with the National Tehuantepec and the New Mexican Southeastern. This road is to be built under the concession from the Mexican Government to Henry S. V. Reed, of London, and Alfred Bishop Mason, of New York.

MIDDLE TENNESSEE & ALABAMA.—About 100 men, according to report, are at work on the extension of this road southwest about 18 miles from Madison Cross Roads, Ala., south through Cluttsville to Decatur. Track has been laid for about 4 miles and the right of way secured to Decatur. C. A. Diemer, Jr., of Fayetteville, Tenn., is Chief Engineer. (Nov. 26, 1897, p. 341.)

MOORE COUNTY & WESTERN.—Contracts have been let, according to report, for grading this road from Concord, N. C., on the Southern, east 37 miles to Craigrowne, and officials have recently gone over the line to select sites for depots for which contracts will be let next month.

NEWFOUNDLAND.—The Newfoundland Government has ratified the agreement made by the Cabinet with Mr. R. J. Reid and possession of all the railroads of the Province of Newfoundland will be given to him April 1. (Feb. 25, p. 149.)

NEW ROADS.—A road 1 1/4 miles in length is reported to have been completed at Fairland, Brunet County, Tex., to connect the Austin & Northwestern with sand quarries.

NEW YORK, NEW HAVEN & HARTFORD.—Vice-President Hall announces that the only obstacle existing to immediate work on the four track improvements through the city of Bridgeport, Conn., is differences in estimates on the value of two pieces of property. When that is adjusted work will immediately begin on the improvement, which is to cost nearly \$3,000,000.

PECOS & NORTHWESTERN.—This company was incorporated in Texas, March 19, with a capital stock of \$100,000, to build a line from Amarillo, Potter County, southwest about 100 miles toward El Paso, Tex., to a point in the southwestern corner of Farmer County on the State line. The directors are: S. H. Madden, W. H. Fuqua, B. T. Ware and R. L. Stringfellow, of Amarillo; A. C. Campbell, of Eddy, N. M.; Percy Hagerman, of Colorado, and W. F. Dunning, of New York.

PITTSBURGH, BRADY'S BEND & LAKE ERIE.—Official statement is received that this company is building its line from East Brady, Pa., a point on the Allegheny Valley, southwest 17 miles to Butler on the Pittsburgh, Bessemer & Lake Erie. Joseph Pool, 62 Cedar street, New York city, is President, and J. D. Haggerty, East Brady, Pa., Chief Engineer.

RALEIGH & CAPE FEAR.—Last Monday 100 convicts were put at work on the construction of this line from Raleigh, N. C., south about 35 miles to Lillington, and it is stated that a force of "free labor" will begin work at the other end of the line next week. The company expects to complete the line during the coming summer, after which an extension southeast will be made from Lillington. (March 11, p. 189.)

SIOUX FALLS, MADISON & ABERDEEN.—This company has been incorporated in South Dakota with a capital stock of \$2,000,000 to build a line from Taopi south to some connection into Sioux City. It is projected by a number of farmers in the vicinity of Taopi to give them better access to markets. The directors are: C. T. Austin, J. E. Colton, Henry Hunter, Garland Ellis, H. J. Johnson, A. T. Austin, L. L. W. Willard, all of Taopi.

SNAKE RIVER VALLEY.—This company has been incorporated in Idaho to build a line from Lewiston west along Snake River about 60 miles to Riparia, Wash., a point on the Oregon Railroad & Navigation Company's line. Henry Failing, of Portland, Ore., is President, and F. W. Kettenbach, of Lewiston, Idaho, Attorney. It is stated that surveyors are now in the field.

SOUTHERN PACIFIC.—This company is laying 75-lb. rails in place of lighter metal, in order to keep up repairs and to procure rails for branch tracks, yards and sidings. Probably 25 to 35 miles will be laid during the year. Pursuing the policy of making renewals of the most permanent character, a number of small bridge structures are being continually renewed with plate girder spans on masonry abutments, to replace timber structures. The routine work of ballasting is also being pushed. The company's aim is to complete from 50 to 100 miles of ballasting each year.

SPOKANE FALLS & NORTHERN.—A bill has been introduced into the Parliament at Ottawa, Ont., for a charter giving the right of extending the road from Northport, in the State of Washington, northwest to Cascade City on the Canadian side of the international boundary, thence west up the valley of the Kettle River to Greenwood City. A bill has already been introduced into the United States Senate granting the right of way on the American side. (Jan. 7, p. 17.)

VANCOUVER, VICTORIA & EASTERN.—Construction is to begin on this road, according to report, about April 1. The road, as projected, is from Vancouver, B. C., east into the interior about 325 miles. The road is owned by McKenzie, Mann & Co., of Vancouver, who have recently been granted the charter for a road to the Yukon. (Oct. 22, 1897, p. 755.)

WESTERN MARYLAND.—This company, according to report, will establish new yards at Shippensburg, Pa., and will build about a mile of new road to avoid heavy grades.

Electric Railroad Construction.

ANDERSON, IND.—The Union Traction Co. will not build an electric line to Greenfield, as had been reported, but we are authoritatively informed the company contemplates building from Alexandria to Elwood, Ind., a distance of about nine miles.

BRAINTREE, MASS.—The New York, New Haven & Hartford Railroad Co. is making an extension of its Nantasket Beach third-rail electric railroad from East Weymouth to Braintree, five miles.

BUCYRUS, O.—The Bucyrus-Galion-Crestline Electric Railroad Co. is stated, has been granted a franchise by the City Council of Crestline.

BUFFALO, N. Y.—The Buffalo Valley Railway Co. was incorporated, capital \$350,000, to build and operate an electric railroad, 27 miles long, from the east city line of Buffalo, in the town of Cheektowaga, to the village of Java, Wyoming County. The directors are: Luther S. Bent and Felton Bent of Philadelphia; Mason D. Pratt and Edgar C. Felton of Steelton, Wyoming County; Herbert P. Bissell and J. Henry Metcalf of Buffalo; Joseph R. Ford and Frederick W. Wood of Baltimore, and Benjamin Watson of Stryker, Wyoming County.

DENVER, COL.—The Denver Consolidated Tramway Co., it is stated, will build an electric railroad, 19 miles long, to the coal fields.

DOYLESTOWN, PA.—The Bucks County Railway Company has been leased by the Doylestown & Willow Grove Trolley Company, now building a road to Willow Grove (Feb. 18, p. 131).

FAIRFIELD, UTAH.—Hirsch Bros. & Co., of Chicago, it is stated, recently bought the Salt Lake & Mercur Railroad, a steam road opened in 1896 and running from Fairfield on the Oregon Short Line to the Mercur mining camp. The new owners of the road will change the motive power to electricity and will probably extend the road farther into the mining district.

FLUSHING (L. I.), N. Y.—A certificate of incorporation of the Flushing & South Shore Railroad Co., with a capital of \$150,000, was filed to-day with the Secretary of State. The company is to build a standard gage road fifteen miles long from Flushing to a point on the Long Island road between Fenhurst and Woodburg, Queens County. The directors are William F. Brown, Edward L. Boyle, William L. C. Allan, George A. Hamilton, William J. Hawson, M. J. Keany and J. Hollis Gibson of Brooklyn, Louis E. Freeman of Orange, N. J., and Francis L. White of Summit, N. J.

FOX CREEK, MD.—The survey has been completed for the Fox Creek Electric Railroad, and the work of securing franchises and rights of way is proceeding.

LOS ANGELES, CAL.—The Los Angeles Terminal Railway will very likely adopt electricity on its Pasadena and Glendale lines in the near future. It anticipates considerable extensions of electric lines but will not adopt electricity on its proposed extension eastward to Pomona. Geo. B. Leighton, President, St. Louis, Mo.

MARLBOROUGH, MASS.—The Committee on Street Railroads of the Legislature reported a bill extending the time for the building and operation of the Marlborough & Westborough Street Railroad to Oct. 1, 1899.

MERIDEN, CONN.—Messrs. Sanderson & Porter of 31 Nassau street, New York, who have the contracts for building the Meriden, Southington & Compo Electric Railroad, say that work will commence within a few days. Several small bridges will be required. It is expected to have the road in operation in July. Francis Atwater, president of the Meriden Board of Trade, is interested in this road.

MIDDLETOWN, N. Y.—The Middletown-Goshen Traction Co. at a recent meeting of directors elected the following officers: Pres., F. McKeige, Brooklyn; Vice-Pres. and Treas., Charles G. M. Thomas; Sec., Henry M. Brundage, New York; General Manager, W. A. Graut, New Paltz. It is stated that the company propose to make some extensions to meet the requirements of the summer traffic.

MYERSVILLE, MD.—The Myersville & Catoclin Electric Railway Company will proceed at once to build the electric railroad between Catoclin and Myersville. It is expected that when this road is completed an extension will be built south to Middletown, where connection can be made with the Frederick & Middletown Electric Railway Company. A bill having this in view is now before the Maryland Legislature. C. F. Flook, Frederick, Md., is president of the Myersville & Catoclin.

NEW YORK, N. Y.—The Union Railroad Co. has commenced work on its proposed road from its present line at the junction of East Third Street and Wolfe's Lane, at Pelham, to New Rochelle. The company expects to push the extension through quickly, and will probably have cars running from Harlem River to Glen Island by July 15.

ONEONTA, N. Y.—The West Oneonta & Laurens Railroad Co. was recently chartered, with a capital of \$75,000, to build an electric railroad about five miles long. The directors are: Frank Gould, Parker Wilson, Albert D. Gutman, Herbert H. Hutman, Walter S. Whipple and Harry W. Lee of Oneonta, and David S. Peet, Peter Seeber and Philip K. Strong of Laurens.

SACO, ME.—Reports state that the Massachusetts Loan & Trust Co. has taken the entire \$300,000 issue of 20-year 5 per cent. gold bonds of the Saco River Electric Railroad, and that the work of building the road will commence at once. Francis A. Hobart and George Hayward, 4 1/2 Beacon street, Boston, are chiefly interested (Dec. 31, 1897, p. 937).

SALEM, ORE.—The Salem Light & Power Co., it is stated, will build an electric road on Trade street.

SCHUYLKILL HAVEN, PA.—The Schuylkill Haven & Orwigsburg Electric Railway Co. has been chartered with a capital of \$60,000.

SYRACUSE, N. Y.—The Onondaga Lake Railroad Co. has given a mortgage of \$400,000 to the United States Mortgage & Trust Co. for the purpose of covering its construction bonds for a like amount.

TORONTO, ONT.—The Toronto Railway Co. contemplates making a number of extensions this year,

principally as follows: The Mimico line to Oakville; Queen street to Balsam avenue and into Munro Park; Kingston road line, three miles in the direction of Highland Park; the completion of the road to Mount Pleasant; a line on York and Lake streets, giving communication with the wharves.

WICHITA, KAN.—The Wichita Railway Light and Power Co. contemplates rebuilding 18 miles and building four additional miles of track, also a new power house, and the installment of new electrical machinery, and will buy 12 closed and 15 open cars. These enlargements and improvements will make the line practically new throughout. W. Q. Church, Vice-Pres. and Genl. Mgr.

GENERAL RAILROAD NEWS.

Railroad Earnings.

Showing the gross and net earnings for the periods ending at the dates named:

		1897.	1896.	Inc. or Dec.
December 31:				
Flint & Pere Marquette.				
1 month	Gross	\$259,213	\$231,669	I.
1 "	Net	64,842	54,299	I.
12 months	Gross	2,791,996	2,594,621	I.
12 "	Net	738,347	658,162	I.
Kansas City, Pittsburgh & Gulf.				
1 month	Gross	\$262,951	\$97,885	I.
1 "	Net	73,011	23,600	I.
Texas Central.				
12 months	Gross	\$344,532	\$293,415	I.
12 "	Net	133,440	84,228	I.
January 31:				
1898.				
Baltimore & Ohio Southwestern.				
1 month	Gross	\$505,648	\$472,492	I.
1 "	Net	112,495	113,060	D.
7 months	Gross	3,994,646	3,644,517	I.
7 "	Net	1,250,517	1,138,461	I.
Burlington, Cedar Rapids & Northern.				
1 month	Gross	\$303,329	\$299,106	I.
1 "	Net	111,660	100,576	I.
Central Pacific.				
1 month	Gross	\$1,051,818	\$858,913	I.
1 "	Net	363,661	274,427	I.
Grand Trunk.				
1 month	Gross	\$1,550,985	\$1,292,160	I.
1 "	Net	425,340	258,494	I.
7 months	Gross	12,486,722	11,413,447	I.
7 "	Net	4,378,479	2,556,865	I.
Lake Erie & Western.				
1 month	Gross	\$275,727	\$252,661	I.
1 "	Net	114,874	104,444	I.
Mexican National.*				
1 month	Gross	\$510,750	\$449,867	I.
1 "	Net	239,310	200,436	I.
*Mexican currency.				
Minneapolis, St. Paul & Sault Ste. Marie.				
1 month	Gross	\$263,083	\$188,830	I.
1 "	Net	87,993	35,397	I.
Pacific Coast Company.				
1 month	Gross	\$373,678	\$246,687	I.
1 "	Net	107,513	20,337	I.
2 months	Gross	723,534	506,633	I.
2 "	Net	180,964	61,084	I.
Savannah, Florida & Western.				
1 month	Gross	\$309,906	\$307,671	I.
1 "	Net	76,170	90,594	D.
February 28:				
1898.				
Baltimore & Ohio.				
1 month	Gross	\$1,851,445	\$1,777,368	I.
1 "	Net	355,194	287,726	I.
8 months	Gross	17,953,250	17,241,563	I.
8 "	Net	4,767,738	3,963,824	I.
Cincinnati, New Orleans & Texas Pacific.				
1 month	Gross	\$321,161	\$261,514	I.
1 "	Net	160,390	94,762	I.
2 months	Gross	653,996	524,797	I.
2 "	Net	211,089	185,785	I.

ADDISON & PENNSYLVANIA.—This road has been ordered sold at Bath, N. Y., under the foreclosure of the second mortgage of \$289,000. Three years' interest remains unpaid, making the total \$352,550.

BALTIMORE & OHIO.—The Attorney General of Maryland has been instructed by the Legislature to institute proceedings in the United States Court for protecting the rights of the state of Maryland in its ownership of stock in the Washington branch of the Baltimore & Ohio. This is a double track line extending from Relay House, 9 miles west of Baltimore, Md., to Washington, D. C., 31 miles. It was built under a charter granted by the state of Maryland March 3, 1833, and opened Aug. 25, 1835. Of the \$1,028,000 capital stock one-third is owned by the state of Maryland; of the balance all but \$72,000 is owned by the Baltimore & Ohio Co. It is one of the best paying divisions of the Baltimore & Ohio road, the net earnings for the fiscal year 1896 being \$99,926, or 16 per cent. of the capital stock. Dividends of 10 per cent. have been paid for a long term of years, but the payment due May 1, 1897, was passed.

CENTRALIA & CHESTER.—An additional issue of \$50,000 of 6 per cent. receiver's certificates has been made, which makes the aggregate of these certificates \$425,000. The proceeds have been used to complete the road, and it is thought that reorganization will not be necessary.

CENTRAL PACIFIC.—The English shareholders favorable to the Lubbock plan held a meeting in London, Feb. 24, and passed resolutions appointing Aubrey Stanhope, N. J. Horgan, T. Stewart Jones, F. J. Launton, Walter Morehead and Edward Fox White as a committee to represent their interests in support of that plan.

CHICAGO & ATCHISON BRIDGE.—The bondholders' committee announce that bondholders who have not deposited their bonds under the reorganization plan must do so before April 11. (March 11, p. 190.)

CHICAGO & EASTERN ILLINOIS.—The Circuit Court at Indianapolis, Ind., decided March 22 that this company must pay the state \$30,000 fee with interest on the same, representing its capital stock under the consolidation which the company effected last year, but failed to file articles of consolidation with the Secretary of State. This company in-

cludes the old Chicago & Eastern Illinois, 624.9 miles; the Evansville & Terre Haute, 155.7 miles, and its leased line, the Evansville & Indianapolis, 150.1 miles, making a total of 930.7 miles.

CHICAGO, BURLINGTON & QUINCY.—Holders of Chicago, Burlington & Northern first mortgage bonds are notified that 73 of these bonds for \$1,000 each and 33 for \$500 each have been drawn by lot for payment at the office of the company in Boston on or before April 1, at the rate of 105 and accrued interest to that date, after which time interest will cease.

CLEVELAND, CANTON & SOUTHERN.—Burnett, Stayton & Campbell ask holders of six months claims to combine to secure and adjustment of these claims on a basis of 50 per cent. of the face value.

DENISON & NORTHERN.—In the United States Circuit Court at Ardmore, I. T., March 14, Judge Townsend annulled the order appointing a receiver for this road. He cancelled all mandates affecting the suit and dismissed the cause without prejudice. This line is projected to run from a point in Indian Territory opposite Denison, Tex., to a point at or near Coffeyville, Kas., with a branch line from a point about 25 miles north of Denison in Indian Territory northwest to a point on the western border of that Territory. Of this 100 miles has been located, 40 miles cleared, and 25 miles in different sections graded and bridged. It went into the hands of a receiver in November, 1895. (Nov. 22, 1895, p. 780; March 4, 1896, p. 169.)

DOMINION ATLANTIC.—Sheppards, Pellys, Scott & Co., of London, announce that they are prepared to receive applications for the new issue of £150,000 4 per cent. second debenture stock recently authorized to provide for the development of through business between Boston, Halifax and St. John. (Feb. 18, p. 131.)

ERIE.—This company has increased its capital stock by \$13,000,000 of preferred and \$13,000,000 of common stock, and gives notice to holders of capital stock of the New York, Susquehanna & Western that it will exchange these shares for shares of that company, to be delivered not later than June 1, at the following rates:

Nine-tenths of one share of first preferred stock of the Erie Railroad Company for each and every share of the preferred stock of the New York, Susquehanna & Western Railroad Company specified in such receipt. One share of common stock of the Erie Railroad Company for each and every share of the common stock of the New York, Susquehanna & Western Railroad Company specified in such receipt.

The Erie has already controlling interest in the shares of this road. (New York, Susquehanna & Western, Feb. 18, p. 132.) The first preferred stock of the Erie will now be \$43,000,000 and the common stock \$113,000,000. The second preferred stock remains as before at \$16,000,000. J. P. Morgan & Co., of New York, are prepared to issue temporary certificates, which will be exchangeable not later than June 1 for voting trust certificates representing Erie stock.

INTER-OCEANIC OF MEXICO.—The first debenture stockholders on Feb. 21 authorized the directors to issue £120,000 of 4 per cent. debenture stock held in reserve under the readjustment agreement of April, 1892. The new stock is to be used for working capital and for the general purposes of the company.

KEARNEY & BLACK HILLS.—Walter H. Sanborn, Circuit Judge for the District of Nebraska, has signed an order notifying all persons having claims against this road that they must file verified statements of the nature, dates of accrual and amounts of their claims with William D. Cornish, Special Master, at Omaha, Neb., on or before May 1, and if they fail to do so they will be debarred from sharing in the distribution of the proceeds of the property in the hands of the receivers. This line is a part of the old Union Pacific and extends from Kearney to Callaway, Neb., 65.74 miles. It went into the hands of a receiver with the parent company, Oct. 13, 1893, and was reorganized during that year. The Union Pacific Company owns \$858,099 of the \$1,577,280 capital stock and \$369,325 of the \$862,000 first mortgage bonds.

LIMA & HONEOYE FALLS.—A Buffalo, N. Y., corporation represented by Frank Schoonmaker, of Rochester, N. Y., and L. E. Wenett, of Buffalo, is reported to have purchased this road. It was chartered in 1892 and opened from Honeoye Falls to Lima, 4.46 miles, March 20, 1893. Operations were suspended in 1895 and the road sold at foreclosure to representatives of the bondholders Nov. 28, 1896. Operations were resumed again a month later, but were suspended in 1897. It is stated that the purchasers will begin ballasting the road at once.

LOUISVILLE & NASHVILLE.—The holders of consolidated 7 per cent. bonds, due April 1, 1898, are notified that the principal and coupons due on that date will be paid in cash on and after that time upon presentation to Vermilye & Co., New York. This company has purchased from the Louisville & Nashville \$12,500,000 of new 5-20 year 4 per cent. collateral trust gold bonds, payable April 1, 1918, and redeemable on or after April 1, 1903. They offer to holders of the old bonds the privilege of exchange at any time prior to April 1 at par with accrued interest to maturity. These new bonds are secured by a deposit with the United States Trust Company, of New York, of \$14,000,000 Louisville & Nashville unified mortgage 50-year 4 per cent. gold bonds, and \$4,000,000 of the Paducah & Memphis Division first mortgage 4 per cent. gold bonds. The proceeds of the new bonds will be used to retire the old 7 per cent. consolidated bonds and to pay for the Paducah & Memphis Division of the road. After the completion of the refunding, the road will be without floating debt and will have a cash surplus of about \$1,600,000 and stocks and bonds in its treasury to the value of from \$8,000,000 to \$10,000,000. The refunding will result in an annual saving in interest of about \$200,000. (Feb. 18, p. 132.)

NEW YORK, NEW HAVEN & HARTFORD.—The Massachusetts Railroad Commissioners on March 17 made application to the Railroad Committee of the Legislature that this railroad be granted permission to lease the New England, in accordance with the plans heretofore stated. (Feb. 25, p. 150.)

OGDENSBURG & LAKE CHAMPLAIN.—The foreclosure of this road is to take place at Ogdensburg, N. Y., May 2, the upset price being \$1,000,000 (Feb. 25, p. 150.)

OHIO SOUTHERN.—Statement is received that the holders of various interests in this road have come to an agreement that it shall be sold within a few weeks. The line runs from Springfield, O., to Wellston, 118 miles, and from Springfield to Lima, 63 miles, with branches aggregating 80 miles. It went into the hands of a receiver May 9, 1895. There are \$67,000 of receiver's certificates outstanding, \$4,000,000 first mortgage, \$2,800,000 general second mortgage and \$8,000,000 consolidated third mortgage, besides \$3,840,000 stock.

OMAHA, KANSAS CITY & EASTERN.—The company has filed a statement of increase of capital stock from \$1,500,000 to \$2,000,000 in accordance with its vote of last December. (Dec. 31, 1897, p. 938.)

PENINSULAR.—Sol. G. Simpson has been appointed receiver of this road, which extends from Sheldon, Wash., to Gordonville, 60 miles. The road was only recently completed.

ST. LOUIS, VANDALIA & TERRE HAUTE.—The townships of Vandalia and Bear Grove, Fayette County, Ill., and Edward L. Thomas, of Belleville, have filed a suit in the Bond County Circuit Court for an injunction and receiver. The bill alleges that the directors have not managed the road in the interest of the stockholders, except of such as hold stock in the Terre Haute & Indianapolis, and that the lessees have failed to pay the annual rent. The St. Louis, Vandalia & Terre Haute, which forms a part of the Pennsylvania Company's line, was opened July 1, 1870. It is leased to the Terre Haute & Indianapolis for 30 per cent. of the gross earnings. In 1896 the Terre Haute & Indianapolis and its leased lines, including this company's lines, was placed in the hands of a receiver. The St. Louis, Vandalia & Terre Haute extends from East St. Louis, Ill., to the Indiana state line, 158.3 miles.

SALT LAKE & MERCUR.—Hirsch Bros. & Co., of Chicago, are reported to have purchased this line, which extends from Fairfield, Utah, a point on the Oregon Short Line, to Mercur, 12 miles, and propose to install it with electricity. This road was opened in 1896 and has a capital stock of \$100,000.

SOUTH ATLANTIC & OHIO.—The sale of this road is advertised to take place April 26. It extends from Bristol, Tenn., to Big Stone Gap, Va., 71.09 miles. It was opened May 1, 1890, and a receiver was appointed Aug. 8, 1892. The decree of sale was handed down about two years ago. The funded debt consists of about \$1,850,000 first mortgage bonds, due July 1, 1917, and \$107,260 equipment bonds. The capital stock is \$1,110,000.

Electric Railroad News

BROOKLYN, N. Y.—A meeting of the stockholders of the Kings County Traction Co. will be held at 40 Wall St., New York City, April 11 for the purpose of dissolving the corporation. A syndicate representing the Nassau Electric Railroad having gained a controlling interest in the Kings County, the company will now be consolidated with the Nassau Electric Railroad. The Kings County Traction Co. was chartered in February, 1896, as successor of the Brooklyn Traction Co. (Atlantic Ave. R. R. and Brooklyn, Bath & West End R. R.) and its lines were almost immediately leased to the Nassau Electric Railroad Co. for a fixed annual rental.

DELAWARE, O.—Press reports state that the stockholders of the Delaware Electric Railroad have decided to offer the road to the citizens of the city for \$37,500, the amount of its present indebtedness.

DETROIT, MICH.—Mr. Robert W. Hemphill, Jr., was recently appointed superintendent of the Detroit, Ypsilanti & Ann Arbor Railway, with full charge of all matters pertaining to the operation of the road; headquarters, Ypsilanti, Mich.

FALL RIVER, MASS.—It is stated that the Globe Street Railway and the Fall River Street Railway have applied to the Railroad Commissioners for authority to consolidate.

LOWELL, MASS.—A bill has passed the Legislature to authorize the Lowell, Lawrence & Haverhill and Lowell & Suburban Street Railway companies to operate cars over each other's tracks in Andover.

NEW YORK, N. Y.—A certificate of the lease of the Second Avenue Railroad Company to the Metropolitan Street Railway Company was filed with the Secretary of State, at Albany, March 19. The Metropolitan Street Railway Company will control the line of the Second Avenue Company during the unexpired term of the company's charter in consideration of an annual rental of 8 per cent. on the par value of its capital stock for the three years commencing March 1, 1898, and 9 per cent. yearly for the remainder of the term of the lease.

A bill has been introduced in the State Senate to amend Section 108 of the railroad law so as to permit any street surface railroad corporation to build a street railroad in and upon tunnels, "or roads or ways depressed below the surface" of parks, with the consent of the local authorities in control of parks, and provides that "any such corporation may construct a street surface railroad through any such tunnel or road now constructed or hereafter to be constructed in such parks and extend the same upon the surface of any street or avenue adjacent to or terminating at such parks." The motive behind the bill is not known, but it is believed to have special reference to Central Park, and, too, with a view to building electric conduit roads across the Park on three available traffic roads.

TRAFFIC.

Traffic Notes.

The Panama Railroad and the Pacific Mail Steamship Co. have made an advance of 50 per cent. in the freight rates on many important commodities from California to the Atlantic Seaboard.

The Chamber of Commerce of Spokane, Wash., has unanimously adopted resolutions remonstrating

against the proposed Federal law abolishing the bonding privilege which facilitates shipments of freight through Canada. The San Francisco Chamber of Commerce has adopted a resolution in favor of the passage of the proposed law.

According to the Northwestern Lumberman, the quantity of logs produced in the northern white pine district this season will be from 10 to 25 per cent. less than had been expected, owing to the shortness of the season. Warm weather set in about March 1 and a good many of the camps had to be hurriedly broken up in order to enable the men to get their outfits out of the woods before the roads were entirely melted.

The sub-committee, to whom was referred the question of differences between the American lines and the Canadian Pacific at the meeting held in this city last week, failed to agree and the meeting adjourned without having reached any solution of the difficulties. The various interests split on the question whether the whole question should be referred to arbitration as it now stands, or whether rates to North Pacific coast points should first be restored to normal conditions and then the general question of differentials to be allowed the Canadian Pacific arbitrated. Efforts to bring about another conference, made since the committee adjourned, have resulted in a call for such a conference, which will be held in Montreal this week.

The Kentucky Railroad Commission has decided in the case of the Franklin Coal Company and others against the Louisville & Nashville that giving a less rate per ton on coal used for manufacturing purposes than that used for domestic purposes was not unlawful. The commission decides that the shipments are not "like" within the meaning of the statutes, and "that to allow a less rate on coal to manufacturing establishments, which use coal exclusively for steam purposes, and which obtain their raw material or ship their product via the railroad giving the less rate, is not in violation of the spirit or intent of the law. To hold otherwise would be to declare it unlawful for railroads, though charging reasonably low tariff rates on coal, to make a still lower rate to manufacturers, when doing so does not injure domestic consumers, but tends to encourage manufacturing industries and thereby develop the State—in fact, injures no one, but is a benefit to all concerned."

Chicago Traffic Matters.

Chicago, March 23, 1898.
Lake navigation is to open on April 1. The outlook is for an immense traffic far exceeding all previous records. The winter grain fleet at this port numbers 138 vessels, and has on board nearly 13,000,000 bushels of grain, charters running from 3 cents a bushel at the beginning of the winter to 1½ cents, the rate now prevailing. Vesselsmen expect that the shipments of iron ore from the Lake Superior district this season may reach 15,000,000 tons.

The official report of the Central Passenger Association shows that since the new interchangeable ticket was placed upon the market in the territory of that organization, the sales have averaged 436 tickets a day.

Chairman Caldwell of the Western Passenger Association, who was chosen arbitrator of the dispute over excess fares on the fast trains between Chicago and Denver, has rendered his decision and fixed the extra fare at \$3. This is the first time this principle has been applied in the West.

The lake and rail lines have fixed a rate on flour of 27 cents per 100 lbs. from Minneapolis to New York, 3 cents less than the all-rail rate.

Passenger officials of the Chicago-California lines report that the Southern California travel the past winter has been heavier than at any time for the past five years.

Western roads have declared a truce in the fight over lumber rates which supposedly is to hold good until April 1. The Burlington, which was the last line to threaten a big cut in the rate between this city and Council Bluffs, agreed not to put the tariff into effect provided the other roads restored rates to the normal basis, and it is hoped that by the end of the present month the rates will all be fully restored.

Eastbound freight rates are still shaky. Shipments for several weeks have been the heaviest on record, but in the face of this, all the lines are accused of tumbling over each other in their efforts to secure traffic. An immense shipment of the Letter wheat was contracted for to be moved east late last week and the rate is said to have been 13½ cents per 100 lbs. to New York. There is said to be 1,500,000 bu. of which the Lehigh Valley got two-thirds. Mr. Letter says that he has contracted wheat to Liverpool via Montreal (probably not all rail) at 11.32 cents a bushel, equal to 18.87 cents per 100 lbs., and brokers say that wheat that went all-rail to the Atlantic seaboard has been delivered in Liverpool for less than 15 cents a bushel (25 cents per 100 lbs.).

The trouble over North Pacific coast passenger rates is still unsettled. The Northern Pacific and the Great Northern are still holding out against the Canadian Pacific's demand that rates be restored to the differential basis pending the result of the proposed arbitration, and the settlement of the dispute appears as far off as ever.

The Southern Pacific has submitted a proposition to its eastern connections to the effect that baggage of through transcontinental passengers be checked through from San Francisco to the Atlantic seaboard in bond. The proposition will doubtless be adopted, as the Canadian Pacific does business in this way and it is a convenience to travelers.

Eastbound shipments from Chicago and Chicago junctions to points at and beyond the Western terminal of the trunk lines for the week ending March 17 amounted to 199,550 tons, as compared with 203,538 tons the preceding week. This statement includes 119,979 tons of grain, 28,182 tons of flour and 15,282 tons of provisions, but not live stock. The following is the statement in detail for the two weeks:

Roads.	Week Ending March 17.		Week Ending March 10.	
	Tons.	P. C.	Tons.	P. C.
Baltimore & Ohio.....	15,093	7.5	15,817	7.8
C., C. & St. Louis.....	17,785	8.9	15,809	7.8
Erie.....	20,890	10.2	19,366	9.5
Grand Trunk.....	20,190	10.1	22,167	10.9
L., S. & M. S.....	27,458	13.8	30,633	15.1
Michigan Central.....	30,116	15.1	24,285	11.9
N. Y., Chi. & St. L.....	22,450	11.1	23,466	11.5
Pitts., Chi. & St. L.....	14,009	7.0	15,087	7.4
Pitts., Ft. Wayne & Chi.....	21,283	10.7	24,870	12.2
Wabash.....	11,100	5.6	12,038	5.9
Totals.....	199,550	100.0	203,538	100.0